ONTARIO / QUÉBEC RAPID TRAIN TASK FORCE FINAL REPORT

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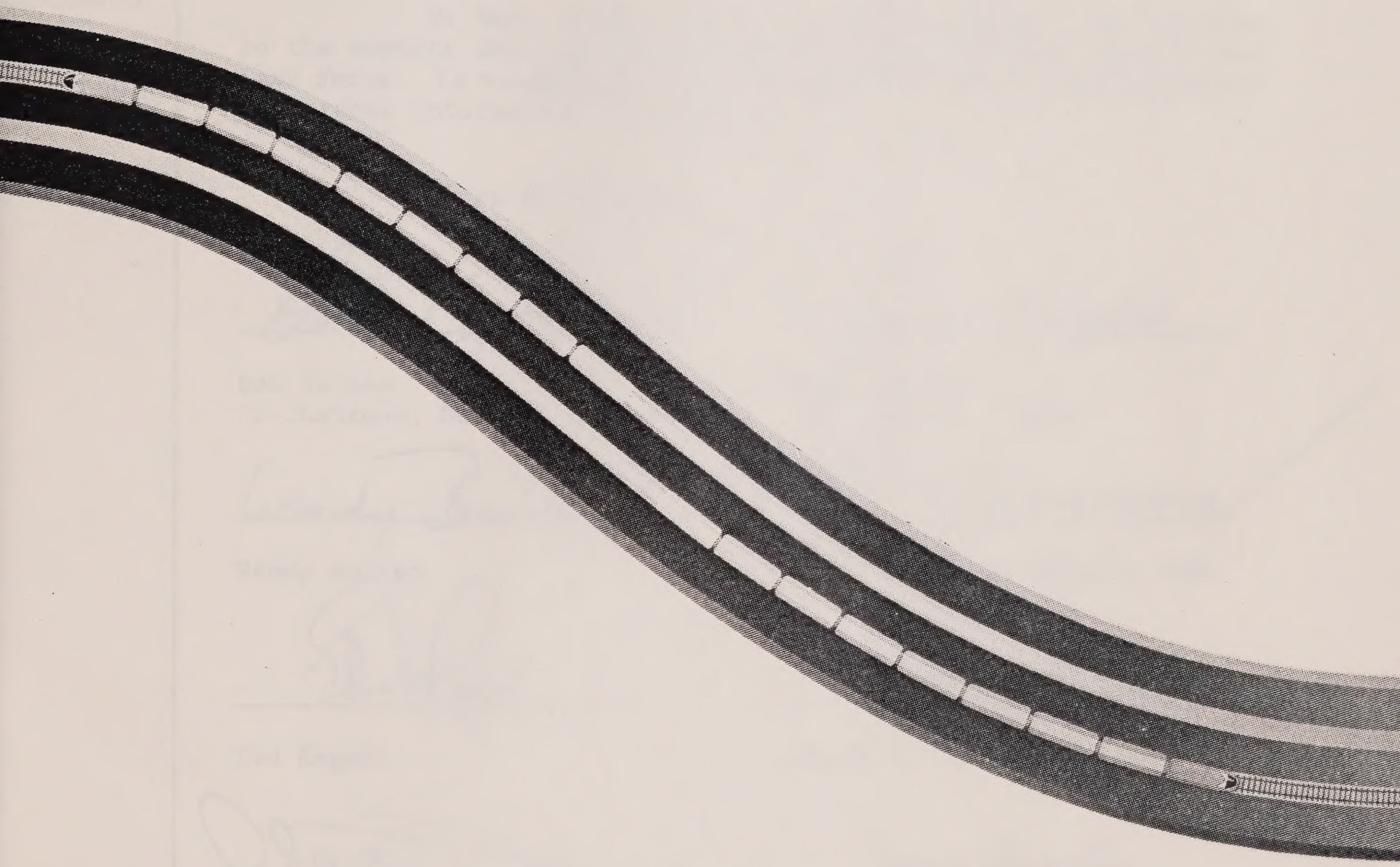

Ontario / Québec Rapid Train Task Force

Groupe de travail Train Rapide Québec / Ontario

Ontario / Quebec
Rapid Train
Task Force

Groupe de travail
Train Rapide
Québec / Ontario

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May 31st, 1991

The Honourable Bob Rae
Premier of Ontario
Legislative Building
Queen's Park
Toronto, Ontario
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Mr. Premier:

We have the honour to present our Report, in response to the mandate that the Premiers of Ontario and Québec gave to our Task Force. We would be pleased to respond to you or your Ministers if further information is required.

Yours faithfully,

Bob Carman
Co-Chairman, Ontario

Rémi Bujold
Co-Chairman, Québec

Wendy Butler

Henri-François Gautrin, MNA

Ted Rogers

Nancy Orr-Gaucher

Charlie Tatham

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The Honourable Robert Bourassa
Premier of Québec
Edifice J
885 Grande-Allée Est
Québec, Québec
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ONTARIO/QUEBEC RAPID TRAIN

TASK FORCE

EXECUTIVE SUMMARY

MANDATE

In June 1989, Premier David Peterson of Ontario and Premier Robert Bourassa of Quebec announced their intention to establish a Task Force to explore the feasibility of a high speed passenger rail service in the Ontario/Quebec corridor. The Premiers indicated they expected the Task Force to examine in depth the political, economic, financial and marketing pre-feasibility of a high speed passenger rail system between Quebec City and Windsor, Ontario, via Montreal, Ottawa and Toronto.

Eight members were appointed, including Bob Carman and Rémi Bujold as co-chairmen with Wendy Butler, Ted Rogers and Charlie Tatham from the Province of Ontario and Nancy Orr-Gaucher, Henri-François Gautrin and Jean Pelletier from the Province of Quebec.

PROGRAM DESIGN

In order to meet the challenge set by the Premiers, the Task Force designed a comprehensive program of research and investigation with the objective of preparing a report which would identify the most viable options for high speed rail and recommend a course of action if it proved warranted.

The principal studies were conducted by independent consultants who were retained after a deliberate and competitive search. Their work was supported by staff of the Ontario and Quebec public services.

A comprehensive public consultation process was also organized. It included formal public hearings in Ottawa, Quebec City, Toronto, Windsor, Montreal and Hull as well as in-camera sessions with many other Corridor municipalities.

During the formal public hearings, ninety-five submissions were made by interested individuals and groups. Among them, Bombardier and ABB (Asea Brown Boveri) presented proposals for high speed systems in the Corridor. Bombardier proposed a «Canadian TGV», replica of the 300 kph French TGV-Atlantique and ABB,

its 250 kph «Sprintor», a new generation of the 200 kph Swedish X-2000. The two systems were calculated to have elapsed times for the Toronto-Ottawa-Montreal corridor at 2 hours 45 minutes and 3 hours respectively.

The Task Force members also met with representatives of Canadian National, CP Rail, VIA Rail, Transport Canada, the Royal Commission on National Passenger Transportation Policy, UTDC, General Motors and with a broad spectrum of interest groups. Discussions were arranged with equipment suppliers, prospective financiers and management teams both at home and overseas.

Task Force members selectively conducted inspection tours of the high speed Corridors in Europe, Japan and the United States where they investigated the social, economic and market-place impacts of high speed rail investments.

In addition, they were able to assess the performance of the respective technologies and their suitability to the Canadian environment. The Task Force members were, without exception, profoundly impressed by the high speed rail systems they visited and by the economic impact they generated.

The research work, which proceeded on a concurrent and interactive basis, was arranged as a comparative analysis of the three generic, alternative investment strategies for high speed rail in the Corridor:

o 200 kph diesel or turbine operation on up-graded, existing railway rights-of-way;

o 300 kph, electrified steel wheel-on-steel rail systems, essentially on dedicated track and/or rights-of-way;

o 400 kph Maglev guideway technology on an entirely new right-of-way.

The capital costs and competitive performance for each case were calculated on the basis of carefully specified alignments and station locations. These, in turn, generated the demand forecasts and operating costs associated with each

investment option. Threaded through this work was an iterative analysis to determine which capital investments were best justified in relation to gains in speed and ridership.

The demand forecasts, which were based on previous surveys of travel behaviour with respect to price, time and frequency, were used also to provide an indication of optimum fares; that is, fares which would generate maximum revenue.

By these means, it has been possible to relate capital costs, operating costs, ridership and revenues for each of the three investment strategies. A computerized financial model of the costs and revenues was produced, enabling the Task Force to test the sensitivity of each investment strategy to changes in fares, ridership, and the sources and cost of capital.

At the same time an economic review of the relative investment impact on the transportation industry was prepared. It drew on the market demand forecast information and on the advice of government and private sector officials concerning its affect on intended investments in airport and highway infrastructure.

A parallel economic study was made of the broader affects of the investments on the economies of the two provinces, in terms of manufacturing, regional development, employment and tourism.

Finally, the three speed options were reviewed to determine their respective impact on the Corridor environment both in terms of construction and operations.

The Task Force's complete body of research work, its extensive public consultation and its investigation of systems elsewhere, together form the most thorough review to date of high speed rail in the Ontario/Quebec corridor.

CORRIDOR CONTEXT

The focus of the Task Force scrutiny is the 1215 km Corridor which links Quebec City to Windsor, through Trois-Rivières, Montreal, Ottawa, Kingston, Toronto and London. It is the busiest route in Canada and generates an enormous volume of travel activity. Although the Corridor is adequately provided for by an all-weather freeway system and by frequent air, bus and conventional train departures, there is no question that the automobile has the dominant share.

Indeed, the recorded 1987 market distribution of about ninety-five million trips was as follows: 89.9% for automobile, 3.7% for bus, 3.6% for rail, and 2.8% for air transportation.

Nevertheless, the public modes do hold a worthwhile portion of the transportation market, more particularly for business travel, between such city-pairs as Montreal-Toronto and Ottawa-Toronto.

The well known problems of airport delay and highway congestion at city approaches could favour the rail mode, particularly when it can compete with airlines in terms of price, frequency, and time, and with the automobile in terms of time and price.

The high speed passenger rail services in Europe and Japan were created to solve these and other problems, using government initiative rather than private enterprise. The systems there enjoy various measures of financial support or market-place protection. There are good reasons for this support, especially where the traditional use, population density and distribution is such that rail is an absolutely essential component of the transportation system.

In the Ontario/Quebec corridor, those that favour high speed rail passenger service claim that transportation problems, coupled with growing public concern for the environment, clearly favour a restoration of passenger rail service in a modern form. They further contend that on their own merits, high speed trains can create a modal shift in traffic, from the air and automobile modes,

sufficient to pay for the costs of their installation, and that, if this is not entirely possible, then the social, economic and environmental benefits of the investment and the corresponding «consumer surplus» can justify any shortfall in revenues.

STUDY DESIGN

In order to manage its comparative analysis more effectively, the Task Force drew on the work of previous research and adopted specified high speed routes to which they applied the investment alternatives.

- **Alternative investment strategies**

  The reasons for studying three alternative investment strategies had as much to do with the differences in available technology as with the search for the most advantageous cost and revenue relationship.

  At 200 kph, it is considered feasible to use existing rights-of-way without the expenses of grade-separating all road and farm crossings and of installing the overhead electric catenary necessary for high speed operation.

  Once above the 200 kph threshold, costs jump for improved track, structures and dedicated right-of-way. To offset these costs, additional revenue must be generated by higher speeds. 300 kph is the highest steel wheel-on-steel rail commercial speed currently available.

  Although installation of a full scale 400 kph Maglev system is recognized as some years off, it was included in the comparison as a potential competitor by the year 2010.

- **Routes**

  Careful consideration was given to the choice of alignments, which were costed and used as the basis for the comparative analysis, but no attempt was made to locate the routes precisely. A much more detailed analysis

would be required as part of a study which should precede any commitment to invest in high speed rail.

Essentially, the alignments used for analysis follow existing or abandoned rail rights-of-way along the north shore of the St-Lawrence River from Quebec City to Montreal, west to Ottawa and Kingston, then to Toronto, London and Windsor on lines parallel to the north shores of Lake Ontario and Lake Erie.

The studies confirmed the physical and operational feasibility of 200 kph and 300 kph systems in the Corridor. The practicality of 400 kph Maglev service remains in doubt at this time, as high speed Maglev systems exist only in prototype form.

The principal advantage of 200 kph technology is the ability to utilize existing rail plant, albeit with certain improvements to line geometry and surface standards. However, a close scrutiny of the circumstances of operating freight and passenger services on the same track indicated that a significant rationalization of freight operations would be necessary to release existing track for dedicated high speed passenger use.

Other physical planning issues were not completely resolved in the Task Force studies, notably the extent to which 300 kph trackage could best be located within existing railway rights-of-way or on new alignments, and the issue of numerous farm crossings which would have to be bridged, diverted or eliminated.

The Task Force is convinced, therefore, that a more detailed assessment will be required before an optimum route can be identified.

o **Travel time**

Travel time is the most important criterion for attracting business ridership. The travel times, derived from careful train performance calculations, are presented below. They provide for two stops on the

Quebec-Montreal segment, four stops on the Montreal-Ottawa-Toronto segment, and three stops on the Toronto-Windsor segment, which elements are descriptive of normal service.

TRAVEL TIMES FOR HIGH SPEED RAIL SERVICE, BY OPTION AND BY SEGMENT

	200 KPH	300 KPH	400 KPH
Quebec-Montreal	2 h 20	1 h 40	1 h 10
Montreal-Ottawa-Toronto	3 h 30	2 h 45	2 h 00
Toronto-Windsor	2 h 30	1 h 55	1 h 10

At 300 kph, the travel time for the Montreal-Ottawa-Toronto segment is consistent with the claims of VIA at 2 h 59, of Bombardier at 2 h 45, and of ABB at around 3 hours for an equivalent service.

o **Operating strategies**

The operating strategies for each investment option were directed at maximizing revenues and took into account probable load factors and vehicle maintenance requirements. In turn, they helped define the frequency of train service and the rolling stock requirements.

DAILY FREQUENCY OF TRAIN SERVICE (EACH DIRECTION) BY OPTION AND BY SEGMENT

	200 KPH	300 KPH	400 KPH
Quebec-Montreal	10	14	20
Montreal-Ottawa-Toronto	12	18	24
Toronto-Windsor	12	16	20

A strategy providing for higher frequency service could require smaller train consists and, probably, a larger rolling stock fleet.

MARKET DEMAND

While 200 kph service may capture an increase in market share, a substantial overall increase in rail ridership requires service at 300 kph, while 400 kph service would achieve even more impressive market results. The total market distribution of the alternative investment strategies shows that the rail mode, which attracted 3.6% of the 1987 market, would win by the year 2010, 4.2%, 6.4% and 9.3% for the 200 kph, 300 kph and 400 kph options respectively.

TOTAL MODAL SHARE COMPARISON BY OPTION

	BASE YEAR (1987)	200 KPH (2010)	300 KPH (2010)	400 KPH (2010)
Rail				
o Million	3.38	5.00	7.79	11.47
o Percentage	(3.6%)	(4.2%)	(6.4%)	(9.3%)
Air				
o Million	2.67	2.59	2.34	2.21
o Percentage	(2.8%)	(2.2%)	(1.9%)	(1.8%)
Bus				
o Million	3.51	5.09	4.99	4.89
o Percentage	(3.7%)	(4.3%)	(4.1%)	(4.0%)
Auto				
o Million	85.26	107.02	106.00	104.62
o Percentage	(89.9%)	(89.4%)	(87.5%)	(84.9%)
Total Trips (Millions)	94.62	119.70	121.09	123.20

The forecast rail volumes in year 2010 by option and by segment are shown below:

RIDERSHIP FORECAST IN YEAR 2010 BY OPTION AND BY SEGMENT

(In Millions)

	200 KPH	300 KPH	400 KPH
Quebec-Montreal	0.93	1.62	2.78
Montreal-Ottawa-Toronto	2.10	3.82	4.70
Toronto-Windsor	1.29	1.72	2.45
«Inter-segment» travel(1)	0.68	0.62	1.54
Total(2)	5.0	7.79	11.47

Notes: (1) Toronto - Trois-Rivières, for example
(2) Rounded totals

The demand forecasts completed for the Task Force were based on 1987 survey data sets assembled by VIA Rail with the help of the federal and provincial Transport departments. While certain deficiencies in that information were suspected, especially for the automobile component, it was necessary for the Task Force to use this material, albeit in adjusted form, as there was insufficient time to undertake entirely new all-mode market surveys.

Separately, there were some concerns for the demand model used by the consultant in forecasting the high speed rail ridership. The «pivot point» approach, which used present rail ridership as a basis for adjusting the forecast of the impact of a «superspeed» train system, was considered by some as too cautious a methodology. In the same vein, the elasticities and modal constants used to forecast consumer response to high speed rail were considered inadequate to represent this entirely new mode of transportation.

Although the demand analysis considered the scale of induced traffic, experiences in Japan and France have shown much higher increases in the number of trips which would not have otherwise been made without the introduction of the high speed rail system.

For these reasons, the Task Force has recommended that a more thorough market demand study is necessary and should include an entirely new, four season, purpose designed survey.

COSTS

The infrastructure costs were based on the necessary civil engineering work required to generate optimum improvements in train performance and these are, of course, consistent with the relative gains in ridership on which revenues were calculated.

The capital investment requirements for each technology option, by segment and for the Corridor are as follows:

TOTAL CAPITAL INVESTMENT REQUIREMENTS (INCLUDING ROLLING STOCK) BY OPTION AND BY SEGMENT

(1990 $ Millions)

	200 KPH	300 KPH	400 KPH
Quebec-Montreal	638	1,717	2,576
Montreal-Ottawa-Toronto	1,284	3,517	5,705
Toronto-Windsor	690	1,874	3,203
Total Corridor	2,612	7,108	11,484

As the figures indicate, there is a wide variation in capital investment costs between the three high speed rail (HSR) alternatives. However, a comparison of the Task Force capital cost estimates with those of VIA Rail, Bombardier and ABB reveals they are generally consistent with those of the other proponents. For the 300 kph option, VIA estimated $ 1.7 billion for Toronto-Windsor costs in its 1989 study, and Bombardier estimated a $ 5.3 billion cost for the Quebec-Toronto segment. These estimates are 8% less and 1% more respectively than the comparable Task Force estimates.

The operating and maintenance costs were developed from unit costs for various expense elements associated with high speed rail service at the speeds and frequencies described above.

As there is a trend to labour efficiencies in the rail industry, it was assumed that by the time a high speed rail service is introduced, «streamlined» labour arrangements will be in place. These were incorporated in the financial analysis.

ANNUAL OPERATING AND MAINTENANCE COSTS

(1990 $ Millions)

	200 KPH	300 KPH	400 KPH
Quebec-Montreal	45	52	65
Montreal-Ottawa-Toronto	104	116	142
Toronto-Windsor	63	69	82
Total Corridor	212	237	289

Under the current labour practice, operating and maintenance costs would be significantly higher; at $ 308 million for the 200 kph option, $ 381 million for the 300 kph option, and $ 400 million for the 400 kph option, representing respectively 45%, 61% and 38% higher costs than the costs of «streamlined» arrangements.

The annual operating and maintenance costs increase with higher speeds. In comparison with other studies, VIA figures are 1% lower for the Montreal-Ottawa-Toronto segment, and Bombardier figures for the Quebec-Toronto segment are 7% higher.

FINANCIAL ANALYSIS

The Task Force's work plan was designed to generate the probable costs and likely revenues for each of the investment options, in order that their respective financial performances could be compared.

The comparison properly took into account the capital and operating costs and the off-setting revenue streams which were respectively derived from the operating strategies and market demand studies for each option.

In the view of the Task Force, the estimates of operating costs and revenues are conservative. The principal financial results are set out in the following table. In each case, operating revenues exceed operating costs. However, these results indicate insufficient financial returns for the private sector to invest in any of the options without government assistance.

COMPARISON OF FINANCIAL RESULTS BY OPTION

(1990 $ Millions)

	200 KPH	300 KPH	400 KPH
Investment	$ 2,612	$ 7,108	$ 11,484
Average revenues	$ 260	$ 439	$ 685
Average operating expenses	$ 213	$ 238	$ 289
Average operating cash flow	$ 47	$ 201	$ 396
Return on investment - IRR	- 1.6%	0.4%	1.2%

The Task Force consultants estimated the level of public assistance required to enable the private sector to earn an acceptable rate of return. The consultant used a discounted cash flow methodology and an inflation adjusted discount rate of 14% to estimate the requisite government grant.

The 400 kph option has a slightly better return than the 300 kph option due to its capacity to attract more passengers at higher fares. However, the Maglev technology remains unproven and there will be difficulties in securing the necessary new right-of-way, particularly in the urban areas. In view of the negative IRR of the 200 kph option and its weaker long term prospects, the 300 kph option should be regarded as the most attractive investment.

In order to examine alternative financing arrangements, calculations were made using discount rates 6%, 11% and 14%. The underlying premises are shown in the table below.

COMMERCIAL DISCOUNT RATES

Discount Rate Premises			
o Required return on equity (after tax)	15%	16.5%	16.5%
o Interest rate on debt financing	10%	12%	12%
o Corporate tax rate	0%	40%	40%
o Inflation	5%	5%	5%
o Capital structure (not incl. govt. grant)			
- Debt	70%	70%	50%
- Equity	30%	30%	50%
Estimated Commercial Discount Rates	**6%**[1]	**11%**	**14%**

Note: [1] This represents a scenario where the two senior levels of government provide a 20 year tax holiday for the private sector investment.

Additionally, a range of more favourable scenarios of increased ridership and fares were tested. This sensitivity analysis of the financial results for the 300 kph option is set out below. It is applicable to the entire Windsor-Quebec corridor as analysis has shown somewhat similar financial results for each of the three segments of the Corridor.

FINANCIAL RESULTS FOR 300 KPH OPTION - INCREASED RIDERSHIP AND FARES

PARAMETERS				RESULTS	
DISCOUNT RATES	FARES	RIDERSHIP LEVEL	TRIPS 2010 (1,000'S)	INTERNAL RATE OF RETURN	GOVERNMENT[1] GRANT
6%					
	Base Case[2]	Base Case[2]	7,786	0.4%	64%
	+10%	+10%	8,564	2.2%	48%
	+20%	+20%	9,343	3.8%	29%
	+30%	+30%	10,121	5.3%	10%
	+40%	+40%	10,900	6.6%	-9%[3]
	+50%	+50%	11,678	8.0%	-31%[3]
11%					
	Base Case	Base Case	7,786	0.4%	80%
	+10%	+10%	8,564	2.2%	72%
	+20%	+20%	9,343	3.8%	62%
	+30%	+30%	10,121	5.3%	51%
	+40%	+40%	10,900	6.6%	41%
	+50%	+50%	11,678	8.0%	29%
14%					
	Base Case	Base Case	7,786	0.4%	85%
	+10%	+10%	8,564	2.2%	79%
	+20%	+20%	9,343	3.8%	71%
	+30%	+30%	10,121	5.3%	63%
	+40%	+40%	10,900	6.6%	56%
	+50%	+50%	11,678	8.0%	47%

Notes: (1) Proportion of discounted capital costs to be provided by governments, in 1990, in order to enable the private sector to earn an acceptable rate of return.3

(2) The «Base Case» fares (optimum level) and ridership level are obtained from the market demand study.

(3) Tax revenues would flow to government.

It will be seen that, with the above range of assumptions, there is a wide variation in the extent of required government investment. As a consequence, the Task Force acknowledged that the extent of required government funding could not be established until an entirely new and wholly reliable market demand forecast has been used to substantiate the financial conclusions. The Task Force considered that it would be inappropriate at this time, therefore, to draw firm conclusions regarding the economic returns to be generated by the project.

Further, the Task Force considered that such analysis might more usefully be cast as a cost benefit analysis which should take into account the findings of the completed economic studies as well as any other relevant information. While the Task Force examined the broader socioeconomic impacts, including the impacts on the environment, they were not sufficiently quantified for incorporation in a detailed cost/benefit analysis.

The Task Force also noted that the financial performance might be improved by the two following considerations:

- There may be some revenue potential associated with station commercialization and real estate development. Although these possibilities were not addressed in quantitative terms by the Task Force, members did meet with entrepreneurial groups who have successful experience in these fields.

- The matter of discontinuance of conventional passenger service and the consequent massive savings for the federal government is both relevant and of major significance. Preliminary estimates indicate that such savings might be in the order of $ 150-170 million annually. In addition, the federal government would avoid the inevitable costs of replacing VIA Rail's corridor passenger equipment, which could constitute hundreds of millions of dollars more in savings. The likely total savings to the federal government, over the time-span used for the financial analysis, is nearly $ 7 billion and has a 1990 net present value (NPV) of about $ 1.3 billion.

A final consideration relates to local HSR service. To simplify its pre-feasibility investigation, the Task Force decided not to consider local services. The studies show, however, that approximately 90% of the required investment would be for fixed plant. Comparatively little additional investment would be needed to support at least some local HSR service. It is possible that an added local service with frequent stops could improve the overall results.

SOCIO-ECONOMIC BENEFITS

The Task Force economic studies indicated that high speed rail would generate clear benefits to its riders, to the communities it served and to industry as a whole. The likely impacts on the transportation sector and on the general economy were estimated by the Task Force consulants.

The «consumer surplus» provides a measure of the anticipated benefits for the riders of the HSR. The Net Present Value (NPV) of the consumer surplus, during the period 2000-2020 is estimated (in 1990 dollars) at $ 489 million for the 200 kph option and $ 2.7 billion for the 300 kph option.

HSR is expected to have a negative impact on air carriers, in terms of reduced passenger volumes and lower revenues, particularly in the Montreal-Ottawa-Toronto segment of the Corridor. The anticipated impact on motor coach operators would be generally neutral and the projected impact on automobile related investment would not be significant.

The construction phase of the HSR project would generate an estimated 45,000 person-years of employment for the 200 kph option and 127,000 person-years for the 300 kph option. The true economic impact would depend upon the state of the economy at the time of the construction work. Should there be significant slack in the economy, for example during a major recession, the investment would be particularly invigorating.

Other economic benefits would accrue to the manufacturing and tourism industries, although the extent of such benefits, while clearly considerable, remain uncertain.

The annual cumulative impacts on the government net tax receipts resulting from the operation of the high speed rail system have been estimated and are presented below. These estimated impacts include the expenditure reductions that might be achieved by governments.

ANNUAL CUMULATIVE IMPACT ON TAX RECEIPTS[1]

(Including Expenditure Reductions)

(1990 $ Millions)

200 KPH	1997-1999	2000-2009	2010-2020	TOTAL PERIOD (1997-2020)
Federal	134	157[2]	156[2]	3,684
Quebec	34	3	3	165
Ontario	52	(6)[3]	(7)[3]	21
Other Provinces	10	1	1	43
Total[4] (All Governments)	230	154	153	3,912

300 KPH	1995-1999	2000-2009	2010-2020	TOTAL PERIOD (1995-2020)
Federal	223	150[2]	148[2]	4,243
Quebec	53	3	2	317
Ontario	87	(11)[3]	(12)[3]	194
Other Provinces	19	(3)[3]	(3)[3]	38
Total[4] (All Governments)	381	139	136	4,793

Notes: (1) These figures do not incorporate GST. This tax may have an impact on the ridership and, therefore, on the revenues of high speed rail.

(2) Includes an annual saving of $ 160 million resulting from the elimination of the conventional rail subsidy.

(3) This negative figure partially results from the loss of fuel taxes.

(4) Rounded totals.

ENVIRONMENTAL ISSUES

Transportation activities play an essential and positive role in the economy of industrialized countries and in the quality of life of their inhabitants. These activities, however, have impacts on the environment. The nature and the importance of these depend on the transportation mode, its technology and the intensity of its use.

The impact of an HSR system on the environment has both direct and indirect components. Direct impacts relate to the division of neighbourhood communities, to landscape intrusion, to noise levels and to vibration; all of which will differently affect farmland, urban, suburban, recreational or rural lands. Indirect impacts concern land use, reduction in energy consumption, improvements in air quality and advances in transportation safety.

The environmental results are more qualitative than quantitative at this stage, but they show that HSR is generally environment-friendly. Compared to air and automobile travel, it is much more energy efficient, contributes less air pollution, and has an excellent safety record. Of the three investment options considered, the 300 kph service was found to have the best overall environmental effects.

However, according to the present governmental laws and regulations, the environmental evaluation process for a HSR project can be expected to be lengthy and demanding. Therefore, the Task Force believes that there should be a full definition of the environmental assessment process to be adopted specifically for this project.

OBSERVATIONS AND FINDINGS

There is a powerful sense among the Task Force members, and within a broad spectrum of industrial, commercial and public interests, that a modern, highly visible high speed passenger train service which hourly linked Quebec City, Trois-Rivières and Montreal with Ottawa, Kingston, Toronto, London and Windsor would promote interprovincial passenger travel and strengthen their business and tourism relationships.

Throughout the Task Force hearings, the Task Force was reminded of the crucial role which the Corridor has in the national economy. Making the Corridor communities more efficient is essential if they are to succeed in the competitive world. Indeed, the Coalition of Corridor mayors urged the Task Force to promote introduction of high speed rail as a means to create a competitive advantage.

There is considerable public support for improved passenger rail services within the Corridor because of the belief that the associated economic and social development would be extensive. The Task Force found again and again at each of the hearings a powerful sense that construction of the new link would do as much to bring Ontario and Quebec closer together as it will to profit our society.

With regard to **High Speed Rail Investment** the Ontario/Quebec Rapid Train Task Force finds:

- That, based on its work to date, it is not able to select a particular technology;

- That all of the high speed options examined have the capacity to generate an operating profit;

- Other users such as the postal service, couriers and «just-in-time» high speed freight would need to be explored to improve the financial viability of the investment;

- Further examination is required of the real potential for levering other types of private sector financial participation through station site development and land development rights;

- A high speed train will make a modest contribution to reducing congestion at key airports and on the Corridor freeways;

- A high speed train would not on its own resolve a key problem raised during the public hearings: urban congestion. It will, however, with expanded commuter rail services, help mitigate the situation;

- Ridership projections show that more passengers will be attracted to high speed rail if travel times can be dramatically reduced. Investment should ensure that door-to-door travel times are fully competitive with the air alternative and with the automobile alternative;

- That any technology selected will have to be assessed in the context of Canadian climatic conditions.

Regarding **Transportation Policy Issues for Government**, the Task Force finds the following:

- Maintenance and improved effectiveness of the existing passenger rail service is a priority, in order to provide continued regional service and to protect the rail market for future high speed rail implementation;

- The continued economic viability of the rail industry as a whole depends on government support for more flexible operating arrangements and government encouragement of more efficient use of the existing lines for intercity, commuter and freight use.

- That «streamlined» labour practices are required if a high speed passenger rail system is to achieve its inherent efficiencies;

- The private automobile will continue to be the dominant mode of passenger transportation in the Corridor. While the Montreal-Toronto and Ottawa-Toronto segments of the Corridor are exceptions to this pattern, as two-thirds and about one-half respectively of all trips are by public transport, we will continue to be committed to a form of transportation which is a significant source of atmospheric pollution and a less efficient user of energy.

- The success of high speed rail systems elsewhere has been related to the willingness of governments to shape consumer choice by policy interventions in the market-place or by direct financial support. For example, in the Paris-Lyon corridor, it is a matter of policy that there is no intercity bus service, and that air fares exceed rail fares. In Japan, the new Shinkansen lines require government subsidy to cover even operating costs. Automobile use is affected by very high gasoline prices and toll road charges in both countries. In all cases, there are significant capital and/or operating subsidies paid to the passenger railways;

- The preference for automobile use in the Corridor would be difficult to discourage as the mode of choice for many trips. Increased fuel taxes, the introduction of toll roads or increased licence fees would be met by taxpayer dissatisfaction. Governments could have an impact on this aspect by requiring all public service travel to be by high speed rail;

- Improved commuter and regional services could have an impact on reduced automobile use, particularly where freeway congestion at city approaches is a problem.

The Task Force finds the following **Transportation Service Issues**:

- There is concern about the capacity of current carriers in the bus, air and rail modes to meet the needs of the frail, elderly and handicapped, and any high speed rail investment would have to make provision for the needs of those people;

- Intermodal connections in the Corridor are only poor-to-fair, compared with Europe. Improvements in linking air, rail and bus are urgently needed in all cities within the Corridor. Improved intermodal facilities would make public modes in the aggregate more attractive to the travelling public.

The Task Force observes the following **Transportation Planning Issue**:

- The selection of a high speed rail right-of-way would be influenced by a number of conflicting factors. In principle, it would be desirable to use existing rights-of-way for reasons which are supported by farmers and environmentalists.

  There are two significant disadvantages: first, the existing rights-of-way are often of inadequate geometric standard, which limits maximum speed; second, combining high speed passenger service with freight service in the same right-of-way increases the cost of grade separations and creates a number of crossover problems in serving freight customers. It should be noted that neither CN nor CP Rail favoured the sharing of their operating rights-of-way.

Concerning **Possible transportation futures**, the Task Force finds:

- It is extremely difficult to forecast changes in transportation technology over a 20-year time-span. Some people suggest that improved technical systems will resolve some of the airport congestion. Others suggest that

alternate fuels or electric cars will eliminate much of the atmospheric pollution caused by the automobile;

- Regardless of these technological predictions, the Task Force believes that the potential of the rail mode to provide intercity transportation at a cost which is less than that for a significant increase in freeway or airport capacity argues for an investment in high speed rail at an appropriate time in the future.

RECOMMENDATIONS

The Task Force has concluded that a high speed passenger rail service could make a significant contribution to business and personal travel in the Quebec City-Windsor corridor in the 21st century. This transportation concept has the potential to provide a new travel experience to millions of Canadians and foreign tourists.

The information that the Task Force has obtained has provided an excellent base that was not previously available. However, before there can be any financial commitment by governments to an investment in high speed rail, that base needs to be supplemented by intergovernmental discussion, by additional private sector business information, plus more detailed review of work already initiated by the Task Force. The additional studies needed are outlined in the recommendations that follow, and consideration should be given to the ordering and timing of them, so that they may run concurrently where possible.

The Task Force recommends that this additional assessment should be undertaken by the two provincial governments, with the active involvement of the federal government and the private sector, as appropriate.

The following specific recommendations are offered for the consideration of the Premiers of Ontario and Quebec:

1. A final decision of «go or no-go» cannot and should not be made at this time. A number of areas should be addressed;

2. The two provincial governments should actively involve where appropriate, the federal government and the rail operators and private sector in all of the further studies which are required;

3. A more comprehensive database must be developed, encompassing all modes, which assesses a full year's travel patterns against the concept of a new high speed passenger rail service and which would lead to an updated full market demand analysis sufficient to satisfy potential investors;

4. There should be a thorough review, involving the rail operators, of the optimum routing for a very high speed passenger rail service, including alignment, capital costs, operating and maintenance expenditures, service options and travel times;

5. There should be a full definition of the environmental assessment process to be followed if the decision is taken to design and implement HSR;

6. A more detailed assessment is needed of the environmental benefits to be gained from the introduction of HSR;

7. There should be a full cost/benefit analysis of the impacts of introducing HSR, which would lead to a more comprehensive understanding and statement of socio-economic benefits;

8. A more detailed examination of the Crown corporation and public utility options for the development and implementation of HSR is recommended;

9. Discussion of the prospective budgetary advantage to the federal government of a partnership investment in Corridor HSR, as a successor to subsidized conventional passenger rail service, is required;

10. A full review and assessment is needed of the commercial and real estate opportunities occasioned by the introduction of a high speed passenger rail service, including concessions, advertising, hotel, retail and residential real estate development, and the introduction of high speed postal and small freight services;

11. There should be close examination of the current railway labour regimes, and an assessment of the changes required to ensure productivity and efficiency in the operation of a high speed passenger rail service;

12. A full examination is needed of current railway legislation and regulation, both federal and provincial; also an assessment of the legal framework is necessary to enable the implementation and operation of a high speed passenger rail service;

13. An intensive examination should be conducted of the potential for rail infrastructure and service rationalization necessary to ensure the utilization of existing railway rights-of-way for HSR;

14. There should be a full examination of the feasibility of introducing, in the future, a high speed passenger rail service based on technologies capable of speeds well in excess of 300 kph;

15. A full examination is needed by all levels of government of the policy support, including capital and operating subsidies, the provision of infrastructure, tax expenditures, and the use of tax revenues afforded competing modes of transportation; and,

16. There should be a thorough study of the need for regional services to those communities which might suffer a deterioration in service due to a concentration on high speed rail.

INTRODUCTION

In June 1989, the Premiers of Quebec and Ontario announced their intention to create a joint Task Force to study the prospects and potential benefits of a high speed passenger rail service between Windsor and Quebec City.

Their announcement was accompanied by a specific mandate:

1. To examine in depth the political, economic, financial and marketing feasibility of a high speed passenger railway between Quebec City and Windsor, Ontario, via Montreal, Ottawa and Toronto.

2. To collaborate fully with VIA Rail Canada Inc. to make every use of VIA's investigations into high speed rail since 1981, including its most recent studies.

3. To hold discussions with potential Canadian and foreign investors and suppliers to the project in order to achieve a major technology-transfer, to be adapted by Canada to North American railway standards.

4. To appraise the full socioeconomic impact of this megaproject on Ontario, Quebec and Canada, including the manufacture in Canada of rolling-stock and other equipment (such as signalling) to North American standards. Environmental impact would also be a key portion of the Task Force enquiries.

5. To hold close dialogue with major Quebec and Ontario municipalities along the proposed high speed rail route and examine the impact on their populations and economies, including tourism impacts.

6. To examine the impact of the project on internal and external tourism in Ontario and Quebec, in full consultation with the tourism authorities of Ontario, Quebec and Canada. This enquiry would particularly include tourism agencies in the United States marketing Canada as a destination and any tourism feed to other provinces.

7. To examine the industrial benefits to Ontario and Quebec of marketing a newly-acquired Canadian high speed rail technology for export to the United States.

8. To appraise the impact of the project on other transportation systems in Ontario and Quebec, such as road and air and, in particular: the alleviation of airport congestion; maximizing utilization of under-used airport facilities; and the promotion of air safety -- all with the possibility of reduced capital investment in airport facilities.

9. In this vein, to examine the feasibility of using a spur of the high speed railway to serve Mirabel Airport and so maximize the considerable capital investment in this asset. To examine the need for further investment at Pearson Airport in Toronto if the high speed railway exists.

10. To examine a corporate structure to design, build, operate and manage this project, with private-sector and provincial government investment, in partnership with the federal government, while not ruling out a revitalized VIA Rail Canada Inc. as the instrument.

11. To propose a preliminary implementation plan, including various construction phases and priorities, as well as schedules.

Subsequently eight (8) members were nominated to the Task Force: Bob Carman and Rémi Bujold, as co-chairmen; together with Wendy Butler, Ted Rogers and Charlie Tatham from the Province of Ontario, and Nancy Orr-Gaucher, Henri-François Gautrin and Jean Pelletier from the Province of Quebec.

In order to fulfil the Terms of Reference set by the Premiers, the Task Force moved quickly to initiate a comprehensive work program.

This had four main components: an integrated package of research assignments, public consultation, fact-finding missions abroad and discussions with railway suppliers and potential investors.

The collected work was completed on-time and has given the Task Force sufficient information to address all but items 10 and 11 of the Premiers' mandate.

The Task Force has deliberately refrained from commenting on the likely corporate form to manage an investment in high speed rail, as this will finally depend on the chosen financial structure. In the same way, the Task Force is not prepared to advise on a desirable implementation plan, noting that decisions on Corridor priorities will depend on more than economics.

The research assignments provided for simultaneous work on the following topics which were the subject of a summary by a coordinating consultant. The consultants responsible for this work are listed in Appendix «A»:

o The review and update of information relating to costs, revenues and ridership contained in previous studies of high speed trains in the Corridor.

- An investigation of the capital and operating costs associated with appropriate operating strategies for high speed rail.

- The analysis of the market potential and revenues for high speed rail services in each of the highly competitive intercity markets of the Corridor.

- A financial analysis of the investment prospects for high speed train service.

- Assessment of the socioeconomic effects of high speed rail on the transportation sector.

- A study of the impact of investment in high speed rail on the economies of Ontario and Quebec and the consequent impacts on employment, income and tax receipts; and

- An examination of the direct and indirect environmental impacts and effects of a high speed train, and the regulatory procedures which will apply.

The public hearings were spread over 11 days and where held in the larger centres of the Corridor. Their purpose was to obtain input from all of the interested individuals and groups as well as to provide information to the public on the objectives and work program of the Task Force.

The Task Force received 95 submissions that expressed, with few exceptions, a strong positive interest in the installation of a high speed train between Windsor and Quebec City.

The Task Force also received two detailed proposals during the course of public hearings, from Bombardier and Asea Brown Boveri (ABB) for the construction and operation of a high speed train in the

Corridor. These proposals were examined extensively during the course of the Task Force work.

The Task Force met certain elected members of the National Assembly of Quebec and the Ontario Legislature, as well as elected municipal representatives through a series of eight meetings in Corridor municipalities. These meetings were particularly useful.

A complete list of all the participants to the public hearings, all those attending the municipal meetings and those who submitted briefs is to be found in Appendix «B».

The missions abroad, described in Appendix «C», allowed the Task Force to benefit from the experience gained in those countries already operating high speed trains. The focus of these visits to Europe, Japan, and the United States, was to discuss the economic, sociopolitical, technical and financial aspects of the introduction of high speed trains, and to establish a basis for comparison with the likely circumstances of a high speed train in the Canadian context.

Discussions with equipment manufacturers and potential investors in this high speed train project were held both in Canada and abroad. The Task Force met representatives of financial institutions, contractors, companies specialized in railway engineering, railway companies, and equipment manufacturers. A list of these organizations is included in Appendix «D».

Implementation of a high speed train system is a very complex prospect. The physical elements of the investment, the economic effects and the human resources involved are all on a massive scale. Such an initiative must be based on a well-founded strategy, which must accommodate all the financial, physical, demographic, economic, commercial, political and regulatory necessities.

All of these matters are inter-related, and their evaluation must be consistent and coherent. Also, the eventual installation must form part of an integrated transport system which serves government policy, environmental priority, and society in general.

In the report which follows, the different chapters describe the circumstances of the Windsor-Quebec corridor and the alternative options available for the development of a high speed rail system. The consequent costs and revenues and the likely performance of the alternatives are considered. This examination revealed a number of important issues and led the Task Force to the observations, findings and recommendations contained in the closing pages.

Chapter 1 describes the demographic, physical, and economic elements of the Windsor-Quebec corridor and illuminates certain Corridor facts. It emphasizes the volume of intercity trips, looks at the market shares of competing modes, and defines the transportation problems.

Chapter 2 is a summary of the findings from the Public Consultation Process.

Chapter 3 describes the high speed train technologies which are available or at the prototype stage, and explains the socioeconomic and other characteristics which led to their installation and to their success. It looks at the principles and approaches that were adopted and the actual experiences of high speed train operators.

Chapter 4 outlines the basic issues and the parameters of the Task Force research work. It describes the basic technological choices available to the Task Force and deals with market forecasts. It describes the demand models used and compares the results with the forecast of others.

It goes on to describe the alternative operational strategies and associated costs of investment, operation and maintenance of a high speed train in the Windsor-Quebec corridor.

It also examines the financial viability of the project, by assembling the results of studies of the market potential and revenues, and the costs of investment, operations, and maintenance.

It determines the financial attractiveness of each option on the Windsor-Toronto, Toronto-Ottawa-Montreal, and Montreal-Quebec segments, and it looks at the level of government investment required to put a high speed train into service in the Corridor.

It also looks at the socioeconomic impacts of the high speed train project on the transportation sector and other sectors of the economy, such as tourism, for Quebec and Ontario.

Finally, it deals with the direct and indirect environmental impacts which could result from placing a high speed train in service in the Corridor.

Chapter 5 describes federal, Ontario, and Quebec environmental assessment procedures.

Finally, Chapter 6, summarizes the observations and findings of this study and the recommendations of the Task Force.

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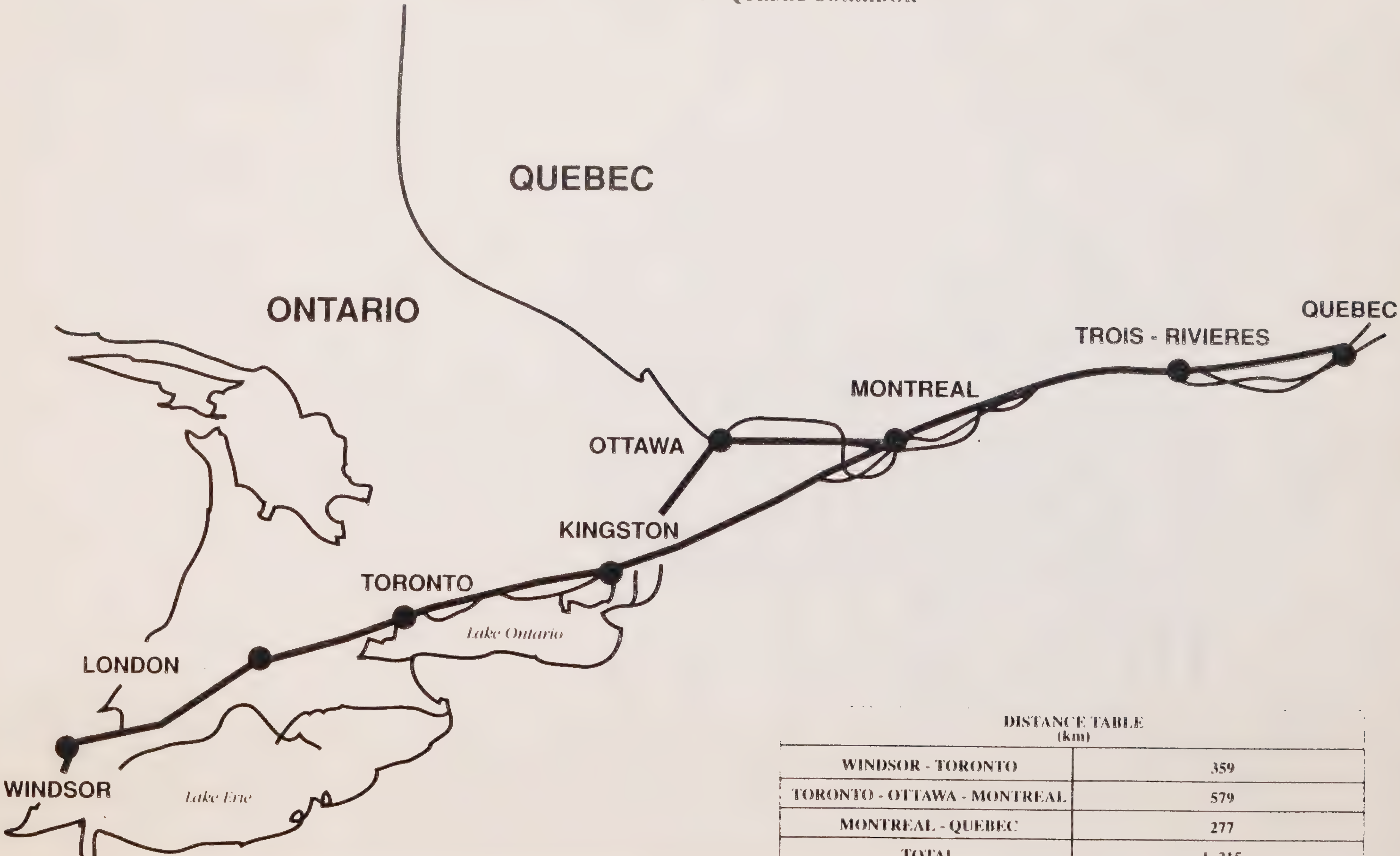
FIGURE 1.1 - THE WINDSOR - QUEBEC CORRIDOR



DISTANCE TABLE
(km)

WINDSOR - TORONTO	359
TORONTO - OTTAWA - MONTREAL	579
MONTREAL - QUEBEC	277
TOTAL	1, 215

1. THE WINDSOR-QUEBEC CORRIDOR IN PERSPECTIVE

1.1 Introduction

Transportation investment has had a significant role in the development of the cities of the Windsor-Quebec corridor. The St. Lawrence River, a natural transportation route, was the original focus of development in the region. The railways, freeways and airports have in their turn brought development and progress to the Corridor by facilitating the mobility of people and the movement of freight.

Over the past 20 years, the development of a high speed rail system for the Windsor-Quebec corridor has been the subject of a number of studies. The present political, social and economic context encourages a new examination, as part of a long term vision of our future.

For the Coalition of Corridor Mayors, the Corridor constitutes the «economic engine of this country». They believe that any action to reinforce its dynamism and vitality could only have healthy consequences for the rest of Canada.

The Corridor, which spans Central Canada, parallels the north shores of Lake Erie, Lake Ontario and the St. Lawrence River, and is illustrated opposite (Figure 1.1). It is essentially straight and flat and along its path are all the principal cities of Central Canada.

The western end of the Corridor at Windsor, and Detroit, is 1215 km from Quebec City. The total Corridor population reached 14.4 million in 1987 and has been characterized by more rapid growth than the national average, as a result of migration from other Canadian regions and from other countries.

The Corridor population is highly concentrated in and around its principal cities. This is a distinct advantage which facilitates an efficient intercity rail service compared to a Corridor where, although the overall population is larger, it is more widely distributed.

1.2 The Principal Cities

Most of the principal cities of the Corridor are located besides important waterways. This feature has a significant impact on certain of them because the bridges, tunnels and ferries designed to overcome the barriers are often inadequate and have become bottlenecks which cause congestion in and around Quebec City, Montreal, Ottawa and Windsor (Detroit).

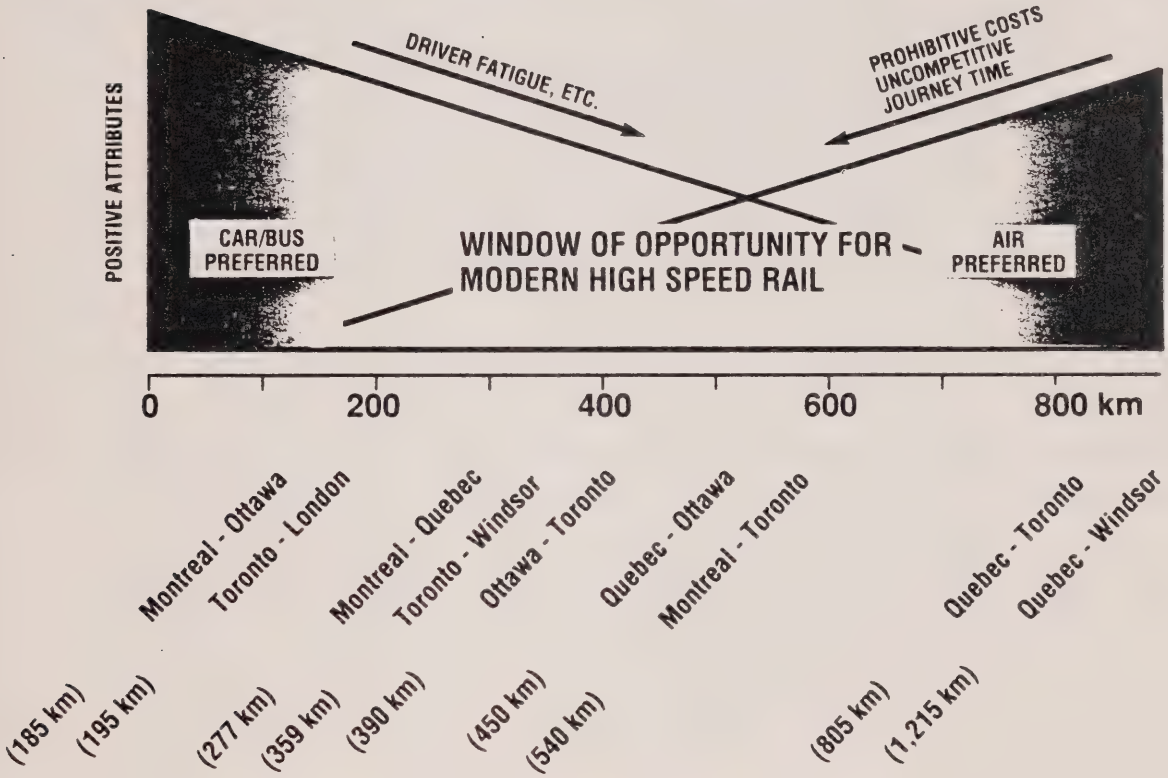
Each of the principal cities of the Corridor has a special status. They include Canada's two largest cities, the federal capital, the two provincial capitals, and many of the provinces' principal communities. Their diverse business, institutional and cultural attractions provide a wide variety of reasons for intercity travel, unequalled elsewhere in Canada. As there are major differences in the patterns of business and non-business travel between the different city-pairs, as well as different modal choice preferences, each Corridor segment is unique and together they give the Corridor its particular and special character.

Modal choice preferences are reasonably predictable as a function of the distance to be covered. Various reports have argued that passenger rail travel has a competitive advantage for distances between 150 and 700 km.

Figure 1.2 illustrates this concept in relation to modal choice and the Corridor distances. Over 150 km, a high speed train becomes an increasingly attractive option in comparison with the automobile

because of reduced travel time and lessened fatigue. For air travel, on routes of less than 700 km, the advantages of speed are more and more offset by higher costs and the difficulties of airport access. It can be observed that all the principal city-pair distances in the Corridor fall within the «window of opportunity» for rail travel.

FIGURE 1.2 - THE COMPETITIVE ADVANTAGE FOR HIGH SPEED RAIL



1.3 The Transportation Systems in the Corridor

The transportation services linking the Corridor cities are relatively well developed, but certain segments suffer from inadequate frequency, limited choice and delays due to congestion.

1.3.1 **Existing Infrastructure**

1.3.1.1 Road Transportation

The freeway system is complete with the exception of a direct connection between Ottawa and Toronto, and between Montreal and Hull. However, in serving longer distance travel, it is increasingly burdened by congestion at the city approaches and by criticisms of its safety. Moreover, for the automobile user, parking at the destination can be a problem both in terms of time lost and expense.

Bus services are important to the Corridor communities as both express and local routes are operated. However, their travel times are affected by traffic congestion in the cities. Urban congestion also has a negative impact on air transportation, making airport access and egress difficult.

1.3.1.2 Air Travel

There are a total of 19 airports in the Corridor capable of serving commercial flights. The busiest are Pearson, Dorval, Ottawa and Quebec City. By far the majority of Corridor flights at these airports are operated by two airline companies; Air Canada and Canadian. Trends in the airline industry, toward deregulation on the one hand and toward corporate amalgamation on the other, do not appear to promise stability in prices or services.

More than 50% of each day's airline traffic moves during the morning and afternoon rush hour periods. This imposes a significant burden on terminal capacity, and inhibits on-time performance. Indeed, peak period congestion at Pearson, by its affects on the other Corridor airports, creates delays at Dorval, Ottawa and Quebec City.

A significant number of flights using the airports originate outside the Corridor. The proportion is 66% at Dorval and 75% at Pearson International. The congestion at Pearson airport remains unresolved, but is currently the subject of in-depth studies and environmental assessments concerning the construction of two new runways.

1.3.1.3 Railway Transportation

The history of railway investment has created a legacy of different rights-of-way between the communities along the Windsor-Quebec corridor. They belong now to the two major railway companies, CN and CP Rail. Those still in operation are used mainly for freight movement but also for VIA Rail's passenger services and for commuter services. As a consequence, there are a number of available alternative routes that could be considered as the basis for selection of a dedicated high speed passenger line.

Over the last decade, fierce competition from the trucking industry has led the railways to emphasize their intermodal services, to abandon certain branch lines and to reduce their activity on certain others. As a result, the Corridor lines have some excess capacity, which may allow some opportunities for advantageous rationalization, and the railways have indicated their preparedness to discuss this, providing there is an objective evaluation.

1.3.2 Characteristics of Intercity Transportation Services

The quality of public transportation is to a large extent measured by the reliability and the frequency of its services, the journey times it can deliver and the cost of the trip.

1.3.2.1 Reliability

VIA Rail's performance has been the subject of much past criticism, particularly with respect to on-time performance. The corporation has, however, worked hard to improve its service and has achieved better results for each of the last four years, to the point that approximately 90% of its departures now arrive within a few minutes margin of the schedule, as set out in Table 1.1

TABLE 1.1 - ON-TIME PERFORMANCE OF VIA RAIL TRAINS

SERVICE	PERFORMANCE RATE (%)			
	1987	1988	1989	1990
Quebec-Montreal	70	75	86	90
Montreal-Ottawa	82	90	88	91
Montreal-Toronto	63	79	83	91
Ottawa-Toronto	67	82	89	93
Toronto-Windsor	77	80	86	90
Toronto-Sarnia	81	78	87	82
Toronto-Niagara Falls	81	77	87	81
Corridor Services Summary	76	82	87	90

Source: Information provided by VIA Rail.

1.3.2.2 Frequency

Table 1.2 provides, for the main city-pair links in the Corridor, the daily frequency of service in each direction, as observed for the year 1987.

TABLE 1.2 - FREQUENCY OF PUBLIC TRANSPORTATION SERVICES
(Daily in each direction, for the year 1987)

SUPERZONE PAIR	AIR	RAIL	BUS
Quebec-Montreal	16	3	23
Montreal-Ottawa	15	5	18
Montreal-Toronto	45	5	5
Ottawa-Toronto	36	3	8
Toronto-Windsor	9	4	7

Source: Prepared for the Task Force by Alpha, Beta, Gamma Consultants and R.L. Banks, Tables 1-4, 1-5, 1-6, July 1990.

Not surprisingly, Table 1.2 indicates a higher frequency for air travel on the longer routes and a high frequency for bus service on the shorter links. By contrast, the rail service frequency is relatively weak in comparison with the other modes of transportation, for all the city-pairs.

1.3.2.3 Travel Time

Travel time is defined by the time spent inside the vehicle, between the point of origin and the point of destination, to which an estimated access and egress time is added for each mode. The automobile, in this situation, is credited with having no access and egress time and is considered, for comparative purposes, as always being immediately available to its user. Table 1.3 gives the resulting travel time for each mode of transportation for the principal links in the Corridor. Railway travel times are not competitive with the most competitive mode on any of the routes.

TABLE 1.3 - COMPARATIVE SUMMARY OF TRAVEL TIMES[1] BY MODE FOR MAJOR SUPERZONE LINKS OF THE CORRIDOR

SUPERZONE PAIR	AIR	RAIL	BUS	AUTOMOBILE[2]
QUEBEC-MONTREAL				
- Run time[3]	0 h 46	2 h 55	3 h 02	
- Access[3]	0 h 51	0 h 57	0 h 23	
- Travel time	1 h 37	3 h 52	3 h 25	3 h 10
MONTREAL-OTTAWA				
- Run time[3]	0 h 40	1 h 51	2 h 04	
- Access[3]	0 h 50	0 h 50	0 h 16	
- Travel time	1 h 30	2 h 41	2 h 20	2 h 15
MONTREAL-TORONTO				
- Run time[3]	1 h 09	5 h 00	6 h 10	
- Access[3]	0 h 56	0 h 52	0 h 32	
- Travel time	2 h 05	5 h 52	6 h 42	5 h 45
OTTAWA-TORONTO				
- Run time[3]	0 h 58	4 h 19	4 h 52	
- Access[3]	0 h 59	0 h 56	0 h 30	
- Travel time	1 h 57	5 h 15	5 h 22	4 h 39
TORONTO-WINDSOR				
- Run time[3]	0 h 56	3 h 56	5 h 01	
- Access[3]	1 h 12	0 h 57	0 h 27	
- Travel time	2 h 08	4 h 53	5 h 28	4 h 04

Notes: (1) These data are for the Base Year, 1987.
(2) The above data is the traffic-weighted average time for the metropolitan areas and include provision for congestion in urban areas and access to city centres.
(3) The above data is drawn from the 1989 VIA Rail study.

Source: Prepared for the Task Force by Alpha, Beta, Gamma Consultants and R.L. Banks, drawn from VIA Rail 1989 Review, July 1990.

1.3.2.4 Costs

Travel costs complete the description of service levels in the Corridor. Those shown in Table 1.4 provide a comparison of travel costs at 1987 rates which include both ticket prices and access costs, for each mode of transport and each major route in the Corridor.

TABLE 1.4 - TRAVEL COSTS

(1987 - $/one way)

SUPERZONES PAIR	AIR[1]	RAIL[2]	BUS	AUTOMOBILE[3] BUSINESS COST AT 28¢/KM
Quebec-Montreal	$ 83	$ 25	$ 23	$ 74
Montreal-Ottawa	$ 76	$ 21	$ 16	$ 52
Montreal-Toronto	$113	$ 52	$ 32	$151
Ottawa-Toronto	$101	$ 43	$ 30	$109
Toronto-Windsor	$ 94	$ 39	$ 27	$104

Notes: (1) The air fares used are for regular economy class flights and are representative of a wide range of other available prices.
(2) VIA Rail's average published fares.
(3) The automobile costs, while accurate, probably much exceed the perceived cost of non-business automobile use.

Source: Prepared for the Task Force by Alpha, Beta, Gamma Consultants and R.L. Banks, drawn from VIA Rail 1989 Review, July 1990.

1.4 The Transportation Market

The passenger use of available transportation services in the Corridor for the year 1987 is represented in Table 1.5. It clearly illustrates the dominance of the automobile in the Corridor as a whole, but also reveals the strength of the public carriers for longer trips and the relative popularity of rail, despite its limited frequency and its uncompetitive travel times.

TABLE 1.5 - VOLUME OF INTERCITY TRIPS INCLUDING OVERALL MODAL SHARE (YEAR 1987)

MAIN ROUTES	AIR	TRAIN	BUS	AUTO	TOTAL
Detroit-London	N/A	34,466	N/A	N/A	N/A
Detroit-Toronto	N/A	93,532	N/A	N/A	N/A
Detroit-others	N/A	59,024	N/A	N/A	N/A
Windsor-London	0	68,813	12,299	1,985,931	2,067,043
Windsor-Hamilton	4,404	40,257	0	677,789	722,450
Windsor-Toronto	95,041	144,827	153,899	773,144	1,166,911
Sarnia-London	0	44,944	0	1,805,630	1,850,624
Sarnia-Hamilton	0	12,943	0	295,705	308,648
Sarnia-Toronto	29,286	70,879	11,765	450,576	562,506
London-Hamilton	2,174	87,153	129,610	5,283,141	5,502,078
London-Toronto	30,350	428,933	414,745	9,960,655	10,834,683
London-Kingston	1,148	21,978	0	816,981	840,107
London-Ottawa	70,700	13,950	7,091	340,010	431,751
London-Montreal	54,884	23,029	0	85,590	163,683
Hamilton-Toronto	0	273,982	251,200	8,063,827	8,589,009
Hamilton-Kingston	3,791	25,209	7,793	1,796,228	1,832,841
Hamilton-Ottawa	113,736	19,713	13,115	502,550	649,114
Hamilton-Montreal	161,865	39,837	40,348	138,488	380,538
Toronto-Kingston	22,217	334,362	181,626	11,431,271	11,969,476
Toronto-Ottawa	652,063	165,856	289,101	1,349,712	2,456,732
Toronto-Montreal	998,550	414,574	123,862	745,122	2,282,108
Toronto-Trois-Rivières	32,822	17,814	0	51,458	102,094
Toronto-Quebec	105,126	33,621	2,359	71,210	212,316
Kingston-Ottawa	0	50,637	65,670	1,536,431	1,652,738
Kingston-Montreal	10,427	82,599	0	364,529	457,555
Ottawa-Montreal	73,641	261,667	693,387	5,567,208	6,595,903
Ottawa-Trois-Rivières	745	6,594	25,178	458,779	491,296
Ottawa-Quebec	43,874	12,229	42,066	305,553	403,722
Montreal-Trois-Rivières	0	46,861	9,934	7,197,763	7,254,558
Montreal-Quebec	76,530	147,280	954,927	6,324,283	7,503,020
Trois-Rivières-Quebec	0	16,476	42,220	2,368,648	2,427,344
Other Trips in the Corridor	77,665	282,806	41,489	14,511,113	14,913,073
Total	2,661,039	3,376,895	3,513,684	85,259,325	94,810,943
Modal Share	2.8%	3.6%	3.7%	89.9%	100%

Source: Prepared for the Task Force by Peat Marwick Main & Co., June 1990, based on data developed and provided by VIA Rail.

1.5 High Speed Rail in the Corridor

1.5.1 The Study Design

The Task Force began its studies of the prospects for a high speed rail investment by a careful review of the transportation circumstances of the Windsor-Quebec corridor. It also considered particularly the relative subsidy and tax environments for each mode and the key issues faced by the industry and by government. In this way, the Task Force was able to focus on the principal strategic options available and to design a work program to meet the Premiers' terms of reference.

That program was aimed at building a definitive body of work with respect to high speed rail passenger service, which could be used as a basis for sound observations and recommendations.

On the basis of the preliminary work and of expert advice, the Task Force decided to undertake a comparative analysis of three generic options for high speed rail. The analysis covered the spectrum of technologies which were expected to be available within the likely construction time-frame.

In the same vein, the routes were selected to take into account the best opportunities for maintaining high speed while effectively serving the population centres, between Windsor-Toronto, Toronto-Ottawa-Montreal and Montreal-Quebec.

1.5.2 Technological Options

The technological options chosen by the Task Force for the purposes of its comparative study are specified by their maximum speeds of 200, 300 and 400 kph.

The 200 kph option is aimed at maximum performance through limited investment. It involves diesel, or turbine, traction operating on

upgraded existing track shared with freight traffic, with the lowest possible expenses for signalling and grade separations. The British HST-125 is an example of this type of technology.

The 300 kph option refers to steel-wheel on steel-rail electrically powered trains which run on tracks entirely dedicated to passenger traffic in rural areas, and that can share track with freight traffic in urban areas at slower speeds. The French TGV is an example of this technology.

Finally, **the 400 kph option** refers to electromagnetic levitation (Maglev), which requires a dedicated guideway along its entire route. The German Transrapid Maglev is an example of this technology.

During the course of the Task Force's work, both Bombardier and Asea Brown Boveri (ABB) presented their own proposals for high speed passenger rail service in the Corridor. Bombardier proposed a «Canadian TGV», replica of the 300 kph French TGV-Atlantique and ABB its 250 kph «Sprintor», a new generation of the 200 kph Swedish X-2000.

1.5.3 The Routes

Of the many available rights-of-way and the possible permutations of their use between Quebec and Windsor, a total of 19 possible routes might be considered for a high speed rail alignment in the Corridor. For study purposes, the Task Force identified routes which were likely to provide the fastest trip times at the least cost. This selection was not based on the kind of rigorous study required to determine an optimal and definitive high speed rail alignment, but rather on the application of common sense, experience and expert advice.

Figure 1.3 outlines the Task Force's basic route selected for study purposes of each technological option.

1.5.3.1 Montreal-Quebec Segment

Between Montreal and Quebec, the selected route follows the north shore of the St. Lawrence River and includes a stop at Trois-Rivières. This route was favoured due to its very limited freight traffic, easier and cheaper access to the city centres and the possibility of serving Laval (the second largest city in Quebec).

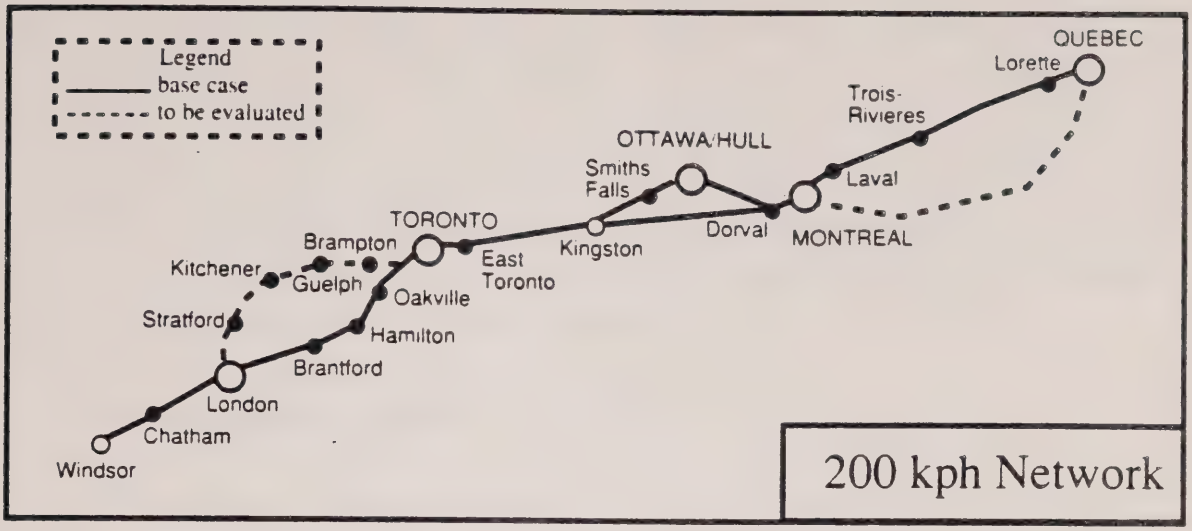
1.5.3.2 Toronto-Ottawa-Montreal Segment

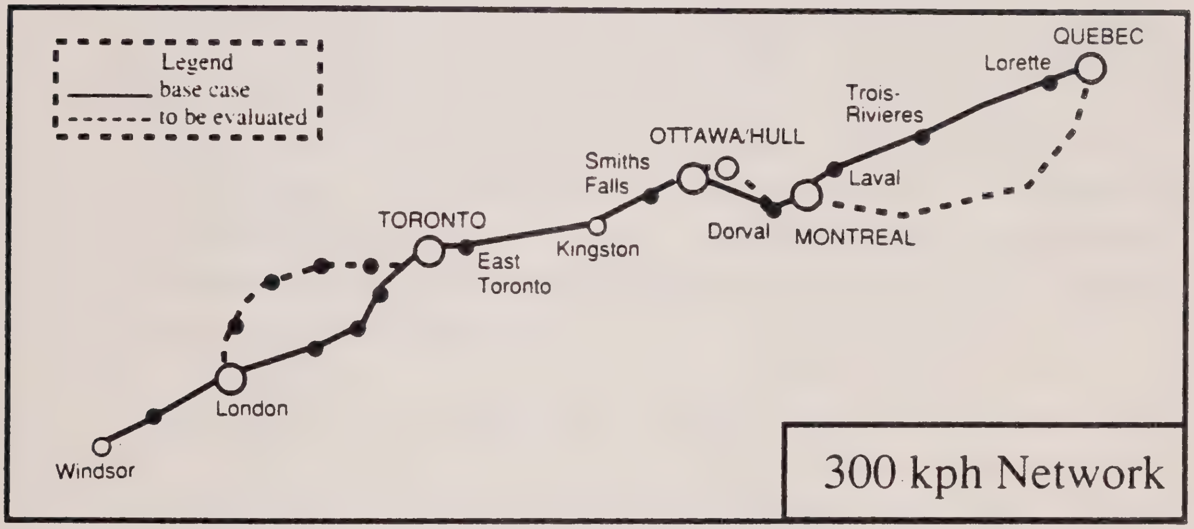
The Toronto-Ottawa-Montreal segment offers a number of alternative opportunities to use existing and abandoned rights-of-ways. CN and CP lines running parallel to the St. Lawrence River and Lake Ontario have always offered the most rapid service between Toronto and Montreal, but have excluded service to Ottawa.

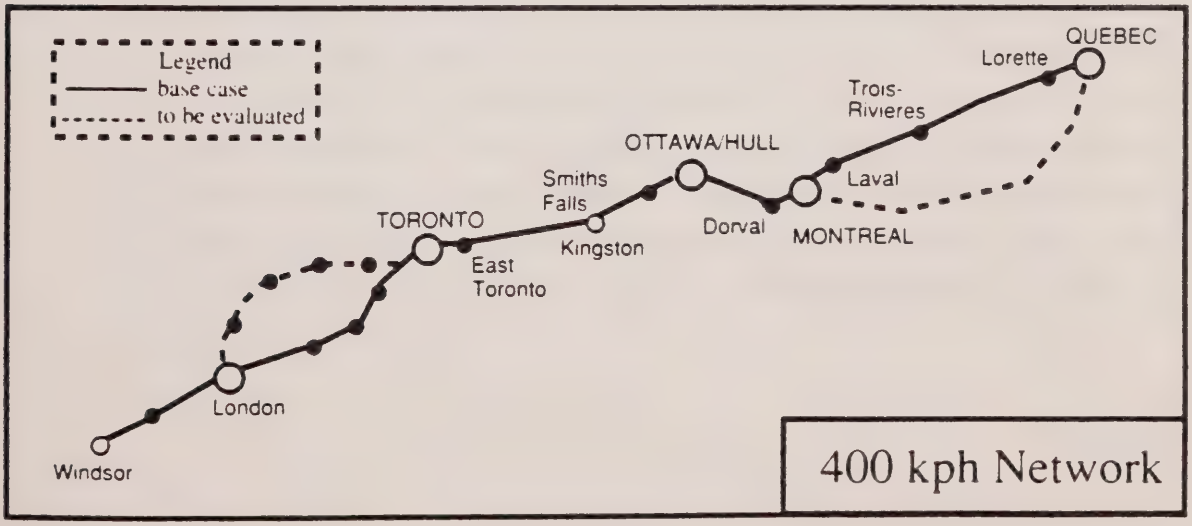
The key issue for this route segment is the choice of using only a spine route through Ottawa, or of operating the triangle using both the lakeshore and Ottawa lines.

For the 200 kph option, the triangle offers the best possibility of reaching a competitive speed between Toronto and Montreal, while still offering a high-quality link to Ottawa. But the triangle route undermines the profitability of the 200 kph option, due to increased costs and reduced revenues. For the 300 kph and 400 kph options, the spine route undoubtedly provides the best solution.

FIGURE 1.3 - BASIC ROUTE SELECTED FOR EACH HIGH SPEED RAIL OPTION







For study purposes, the Task Force decided, after some consideration, to opt for the spine route via Ottawa for both the 200 and 300 kph options, using the CN Alexandria and Smiths Falls subdivisions. In practice, the M & O or Lachute subdivisions should also be considered and might prove more attractive for the final route. Analysis shows that the Smiths Falls subdivision is the most effective route between Ottawa and the Kingston area where it would join the CN lakeshore route between Montreal and Toronto.

1.5.3.3 Windsor-Toronto Segment

The Windsor-Toronto segment also offers a wide range of alternative routes.

For study purposes, the Task Force has chosen the CN line between Windsor and Toronto as the main route for the 200 and 300 kph options. It should be noted, however, that when the time comes for a final choice of the high speed rail route, various combinations of CN and CP tracks are possible. The final choice should depend to some extent on the convenience of a through connection to the Detroit-Chicago corridor.

1.5.3.4 Comparison with VIA, Bombardier, and ABB Routings

The routes proposed by Bombardier, ABB and VIA Rail differ, especially in the Montreal-Ottawa-Toronto segment. Bombardier proposes to exit Montreal using the CN Mount-Royal subdivision to Eastern junction, the CN St. Lawrence and CP Park Avenue subdivisions to Laval and the CP Lachute subdivision to Hull, from there using the abandoned Smiths Falls subdivision to Napanee and the existing CN Kingston subdivision to Toronto. ABB favours the CN Montreal and Kingston subdivisions to Dorion, the CP-VIA (formerly the M & O subdivision) to Ottawa, the CP line to Prescott and the CN line to Kingston and Toronto.

In the same Montreal-Ottawa-Toronto segment, VIA Rail's 300 kph proposal attempted to avoid existing rights-of-ways, arguing that the costs of land acquisition would be lower than the costs of improving existing track. The route follows the CN Mount-Royal subdivision to Deux-Montagnes, a new right-of-way to the former M & O subdivision to Ottawa and from there the CN track to Smiths Falls, a new right-of-way to Belleville and from there the CN track to Toronto.

1.6 The Legal and Institutional Context

1.6.1 Federal Jurisdiction

As the backbone of the Nation's transportation system, rail services in Canada have been a federal government responsibility. Indeed, a railway operating across provincial boundaries falls under federal jurisdiction, even if owned by a province. While there is no specific Act covering passenger rail transportation, there is a large body of legislation controlling railway operations in general. Consequently, VIA Rail is subject to the Railway Act, the Railway Safety Act, the Canadian Railway Accident Investigation and Safety Board Act, and the National Transportation Act, 1987.

The National Transportation Act created the National Transportation Agency to ensure its application. In practice, safety issues are under the jurisdiction of the Minister of Transport, and the National Transportation Agency takes care of matters of public interest and of third party issues.

Until January 15, 1990, when VIA Rail suffered significant cuts in its transcontinental and regional services, it had to obtain National Transportation Agency approval for any modification to fares or services, even after having obtained government authorization. These same procedures had to be followed for any

modification to route, frequency and type of service, until November 1990. The Agency had complete freedom to study VIA's requests, including holding public hearings on them.

This regulation limited VIA Rail in its ability to respond to market conditions. Since January 1990, VIA Rail has benefited from independence in setting its fares and since November 1990, it has also been free to modify its routes and services without the approval of the National Transportation Agency.

This easing of regulation follows directly from the decision of the Government of Canada to reduce passenger rail services in Canada. At the same time, the Government of Canada announced the creation of a Royal Commission on National Passenger Transportation, to which it gave a mandate «to study and report on a national integrated system of intercity passenger travel which would respond to the needs of Canada and Canadians in the 21st century, and which would maintain and improve the relationships between the regions and the communities of Canada.»

The Task Force has maintained contact with the Commission during the course of its work.

1.6.2 Equity Between Modes

In Canada, transportation modes are not all under federal jurisdiction. The provincial governments have full jurisdiction over urban transit as well as full responsibility for intra-provincial freeways and bus services. The federal government, however, has regulatory authority over the aviation, railway and marine industries.

Thus, major investment decisions by one government could unintentionally favour one mode at the expense of the others. A

comprehensive policy does not exist for either freight or passenger transportation. Such a policy could determine the appropriate balance of the various transportation modes to maximize their effectiveness, efficiency and competitiveness as part of an integrated transportation system. By these means, it would be possible to ensure equity between modes, without compromising government priorities or prejudicing the interests of industry.

This equity might also be obtained through some regulatory or fiscal adjustments. In practice, all modes enjoy either direct or indirect subsidies, from one level of government or another, either through use of infrastructure or by support of operations. At the same time, they incur unequal levels of arbitrary taxation. Although an attempt to introduce more equitable arrangements for the transportation modes could be arduous and complex, it would be beneficial to the carrier companies and their passengers.

Rail is the only transportation mode, except for pipelines, which must assume all the costs related to the ownership and maintenance of its infrastructure. The full burden of these costs has a major impact on the financial viability of any railway investment.

With respect to transportation priorities, it is therefore relevant to note that outside North America, there is not a government which does not play a role in the funding of railway infrastructure.

1.6.3 Working Conditions in the Railway Industry

Over the last 10 years, labour relations in the railway industry have evolved to a higher level of cooperation and understanding. However, further changes in labour practice must be implemented to ensure the continued viability of railway operations, particularly in the rigorous competitive context established by the National

Transportation Act, 1987. Later in the report, we refer to these changes as «streamlined» labour practices.

The Task Force consultants have advised that the impact of current working conditions on the operation of a high speed rail system would be considerable.

The areas requiring major modifications include staffing and compensation. The current agreements, which apply to conventional passenger train operations and include some rules that date from the steam era, would be inappropriate for high speed rail. High speed rail would require low staffing levels and flexible rules for train crewing, maintenance-of-way teams, equipment maintenance teams and service and administrative personnel. New labour agreements would have to be negotiated for this new and radically different technology.

In comparison, Amtrak, the American equivalent of VIA Rail, successfully negotiated an hourly compensation base for conventional trains in 1972, shortly after its creation. Further adjustments would also be required if higher speeds were introduced.

1.7 The Windsor-Quebec Corridor in Perspective

In view of the institutional and infrastructural issues now affecting transportation in the Windsor-Quebec corridor, it is clear that investments of time and of money are required to improve the capacity of the system and to better prepare for its future. The supply of funds is limited, and the most useful way to ensure its best use is by research into new ideas and by encouragement of initiative.

These efforts should be undertaken with long term vision as Canadians become more concerned with the importance of protecting the environment and of achieving a superior quality of life for

themselves and their children. The modernization of the Corridor transportation system is long overdue and deserves the attention of government in following the successful examples already set elsewhere in the World.

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2. THE PUBLIC CONSULTATION

2.1 Introduction

The activities conducted by the Ontario/Quebec Rapid Train Task Force in its Public Consultation Process were extensive.

On February 27, 1990, the Task Force officially launched its Public Consultation Process by issuing a press release announcing that it would be arranging Public hearings in the major Corridor centres. The public sessions were designed to allow interested parties to meet with the Task Force, and to share their views with respect to high speed rail (HSR) passenger services in the Windsor-Quebec corridor. The Public hearings were held in Ottawa (March 20-21), Quebec City (April 10-11), Toronto (April 19-20), Windsor (May 2-3), Montreal (May 10-11), and Hull (May 24).

During this period, informal meetings were held with representatives of many of the other communities located along the Corridor. The objective of these meetings was to provide an opportunity for local municipalities to convey their comments and concerns about HSR directly to the Task Force during in-camera sessions.

A total of eight municipal meetings were held, in Brockville (March 13), Cornwall (March 14), Kingston (March 15), London (April 24, in the morning and afternoon), Kitchener (April 25, in the morning and afternoon), and Cobourg (May 8).

The Task Force separately received fourteen written submissions in addition to the eighty one submissions presented at the Public hearings.

The presentations were made by representatives of municipal governments, environmental groups, farming organizations, special

needs groups, the transportation industry, and a number of private citizens. The complete list of participants to the Public Consultation Process is included in Appendix «B».

The very professional presentations and kind cooperation of all the petitioners and participants was a great help in enabling the Task Force to achieve its objectives for the Public Consultation Process.

In the following pages, the many views expressed by those who addressed the Task Force are reported according to the issues they raised and their implications for society, the economy and the environment.

2.2 The Need for High Speed Rail (HSR)

Many of the participants to the Public Consultation Process made a point of expressing their views concerning the need for high speed rail, either offering supportive comments favouring the project, or setting out specific conditions for its implementation.

2.2.1 Assessment of Need for HSR by the Participants

The vast majority (97%) of participants recognized a need for high speed rail service in the Windsor-Quebec corridor. Most of them either supported HSR for specific reasons or favoured implementation of HSR service in general terms. Others, such as the Ontario Motor Coach Association, the Chamber of Commerce of Metro Montreal and the Chamber of Commerce of Quebec Metro, supported the project in principle, but with certain conditions.

Opposition to an HSR project was expressed by the Quebec Bus Owners Association who claimed that no study presently existed which could justify the implementation of HSR. Also, some participants to a meeting held in London, Ontario, considered HSR as unacceptable to

rural communities. It was stated that farmers already face enough obstacles across their land and that another utility line or transportation right-of-way would be a further injury. Finally, Mr. Harold Geltman, a private citizen, opposed HSR as he claimed it would be mostly for businessmen. He argued that an investment which favoured the younger generation deserved the first priority.

2.2.2 Supportive Comments

The supportive comments made by participants favouring HSR may be grouped into three categories. The first includes comments related to the degree of need for the project; the second concerns the project timing; and the third includes other specific considerations.

In terms of **degree of need**, a number of the participants stressed the vital necessity of the project. The Regional Municipality of Ottawa/Carleton described the project as a priority. Transport 2000 Canada emphasized that high speed rail service should be a national goal. Among others, the City of Laval, the Quebec Union of Municipalities, the Quebec Chamber of Commerce, and Transport 2000 Quebec all described the HSR project as essential. Others, such as the City of Toronto and the City of Oshawa, emphasized the need for improved passenger rail services. The Alliance of Canadian Travel Associations (Ontario) expressed a very strong interest in HSR as a complement to other travel services.

As far as the **timing of the project** is concerned, the City of Ottawa, the Ontario Traffic Conference, and the Laurentian Development Corporation all described the project as urgent. Also, the Coalition of Corridor Mayors emphasized a need for immediate action. However, participants to the London meeting, and representatives of Metro Toronto, considered that the project could be phased in by incremental investment, on existing lines, as it has merit in the long term.

Other specific considerations included comments related to commercial viability, the quality of life, and individual mobility.

The Montreal Urban Community, the City of Montreal, and the Outaouais Regional Council for Development, were convinced of the justification for an HSR project. The City of Hull referred to the success of high speed rail in other countries and the Consumers Association of Canada, described the project as important in offering a potentially viable travelling option. The Regional Municipality of Peel suggested that the demand for high speed travel cannot be satisfied by existing services and facilities. The Kingston Area Economic Development Commission and the City of Cornwall encouraged the establishment of HSR but only for the Toronto-Montreal segment. Transport 2000 Ontario emphasized the enormous potential ridership between Windsor, London and Toronto. The Electrical Contractors Association of Ontario assured the Task Force that a skilled workforce is available for the project. Mr. Roger Létourneau, a consultant, described high speed rail as the most viable alternative for maintaining personal mobility. Finally, the Michigan Department of Transportation suggested that the Windsor-Quebec corridor is a particularly significant prospect for HSR service.

The quality of life has been argued as a justification for supporting HSR. The Quebec Union for Conservation of the Environment claims that rail is the most environmentally friendly mode and that its improvement should be a priority. The City of London indicated that it looks forward to a positive future that includes HSR. For Mr. Ed Banninga, a private citizen, HSR is a very civilized form of transport and in this vein, the City of Gatineau expressed the conviction that HSR is the most desirable mode from the standpoints of the ecology, the economy and safety.

Concerns were also expressed by a number of participants who otherwise favoured the project. The Board of Trade of Metro Toronto

was particularly concerned with the market demand and cost aspects of HSR. The Regional Municipality of the County of Papineau expressed concerns with the possible environmental impacts of the route and with its potential profitability. The City of Cornwall expressed its concern that its interests as a smaller centre might be overlooked. Finally, although CN Rail supported the concept of high speed rail in the Corridor, it warned that marketing the service successfully will require careful planning.

2.2.3 Specific Conditions

Those participants who put conditions on their support for the implementation of HSR, did so through concerns for profitability, government intervention, and the social and environmental implications of the chosen route and station sites.

The Association of Consulting Engineers of Canada was in favour of HSR providing the project could be viable. The City of Gatineau also supported the project on condition it would be **profitable**. Similarly, the Canadian Bus Association was not opposed to the project provided it could be justified on economic grounds and would not require any subsidy. The Ontario Motor Coach Association supported the project in principle, with the condition that HSR should achieve full cost recovery from its users without any subsidy. Finally, the Roads and Transport Association of Canada (RTAC) was in favour of HSR but not at the expense of highway investment nor as a charge to highway users.

The Federal Bureau of Competition Policy also made its support conditional, that no **government subsidy** be required. However, the Ste-Foy Chamber of Commerce and the Chamber of Commerce and Industry for Metropolitan Quebec City advocated private leadership but suggested government support should be provided to ensure the success of the project.

A number of participants expressed specific concern for the **impact of the investment** in HSR and the changes it would create. For instance, the County of Kent was in favour of HSR but only if it used existing rail corridors. The Alexandria Save the Train Committee supported the HSR project but argued that it must not replace the existing passenger rail service. The City of Belleville was in favour of the project but on the assumption it should serve the smaller urban areas. Finally, the City of Quebec and the Quebec Urban Community were in favour but stressed nothing should compromise the full construction of the entire Corridor. However, implementation by steps would be acceptable providing a commitment was made at the outset that the entire Corridor would be served.

2.2.4 Proposals

During the course of the Public Consultation Process, the Task Force was presented with certain specific system proposals for high speed rail. One of these came from a rail influence group, two from major manufacturers and another from a consultant.

The **Think Rail Group** proposed their TRG Train, a 200 kph electric system to be operated on existing rights-of-way but using dedicated tracks. The group suggested use of a direct line between Montreal and Toronto, with a branch line at Brockville for Ottawa service, using two-car trains every thirty minutes between Montreal and Toronto, providing both express and local services. The group estimated the cost of the new tracks at $ 2 billion. The total cost was not quantified but was claimed as cheaper than the higher speed alternatives.

The **Bombardier Corporation** proposed the introduction of the French TGV technology, for which the Company holds the North American licence. This 300 kph electric option would operate mostly on existing rights-of-way but with dedicated tracks. The Corporation

reported the results of its own pre-feasibility study of the Toronto-Quebec portion of the Corridor. The total cost was estimated at $ 5.3 billion, of which $ 3.7 billion could be privately financed, the balance of $ 1.6 billion constituting the possible government contribution required. Bombardier announced its plan to form a consortium which would be assembled before the end of 1990.

Asea Brown Boveri (ABB) proposed the «Sprintor», a 250 kph technology derived from the Swedish X-2000 train, using electric propulsion and operated on existing rights-of-way and tracks. This equipment can run at higher speeds on existing track using its steerable axle and tilt technology. ABB indicated that its pre-feasibility study of the entire Windsor-Quebec corridor had indicated that a total investment of $ 3.0 billion, which could be entirely financed by the private sector, would put this system in place.

Mr. Albert J. Mettler, a consultant in Electric Railway Design, suggested the Task Force should consider a fourth option using a lower cost 200 kph technology operating on dedicated and fully grade-separated tracks but using existing rights-of-way. Component unit cost estimates were provided but no total cost of the project was offered.

2.3 Parameters of High Speed Rail

Several specific points concerning the route, speed, and station site parameters for HSR were mentioned during the Public Consultation Process. The service characteristics, frequency, technology options and financing, operations and implementation alternatives were also issues which were raised at the different hearings.

2.3.1 Service Characteristics

The service characteristics mentioned included the matters of reliability, frequency, travel time, comfort, accessibility and fares.

The **reliability** of high speed rail was the basic element most frequently identified by the participants as an essential requirement. The importance of a proven technology, reliable in all weather conditions, especially adapted for Canadian winter conditions, and ensuring on-time performance was mentioned by most participants.

Frequent services are expected by the majority of the hearing participants, to successfully compete with the alternative choices offered by the air carriers and the private automobile. Typically, a daily frequency of 10 to 20 trains between Toronto and Montreal was recommended.

The expected **travel times** between the city-pairs were always described in terms of downtown to downtown service. To be attractive to consumers and to be considered as a high speed train service, the travel time between Montreal and Toronto was stated by most participants at between two and one half hours and three hours. In the Montreal-Quebec segment, a travel time of one and a half hours was preferred and it was pointed out that more than two hours would be unattractive. The Montreal-Ottawa segment is expected to take not more than one hour and fifteen minutes. The Ottawa-Toronto and Windsor-Toronto segments should take not more than two hours each.

The intermediate cities, like London and Kitchener, indicated a preference for lower maximum speeds and more stops.

Superior **comfort** characteristics are expected. Indeed, for most participants, superior travel quality is essential to the competitive success of a high speed train service.

Accessibility was addressed by a number of participants and their comments covered particularly station access, and wheelchair access at stations and in boarding. Transport 2000 Ontario recommended that high-level station platforms should be considered for quicker accessibility for all ages and especially for senior citizens and the disabled. These groups constitute a large share of VIA Rail's ridership, particularly as rail is the best equipped intercity transportation mode for the disabled.

Fares are a critical component of market penetration and are related to the subsidy issue. It was argued that HSR fares should be affordable to people who cannot pay regular air fares, but not at the expense of the bus industry, especially if public subsidies are involved. For business trips, the HSR fares could be in the range of 70 to 80%, and even up to 100%, air fares. The bottom line for many was that the service should be cost-efficient and profitable, and that various tariff levels should be established to be attractive to a wide range of consumers.

2.3.2 Route and Station Locations

There are alternative routings between the principal city-pairs and these were the subject of various participants' comments.

There was near unanimity that the Montreal-Quebec segment should be operated on the North Shore of the St-Lawrence River. The exception was the City of Drummondville, supported by a number of surrounding municipalities and organizations located on the South Shore. Mr. Albert J. Mettler, the consultant in electric railway design, also favoured the South Shore route.

The location of the Toronto-Montreal segment has been generally assumed to include Ottawa, following existing rights-of-way owned either by CN or CP Rail.

For many participants, the Montreal/Ottawa-Hull segment was the most controversial, and was closely related to the station location issue in the Ottawa or Hull area.

An HSR station in Hull would be better accessed by a route on the North Shore or Quebec side of the Ottawa River. If the existing VIA station in Ottawa was used by HSR, one of the South Shore routes on the Ontario side of the Ottawa River would be more appropriate.

Municipalities along the Corridor expressed their preferences according to their proximity to the route. It was accepted that difficult choices would have to be made, but most participants acknowledged the need to assess the alternatives using sound economic analysis as the primary process in the selection of routes and stations.

The Quebec and the Outaouais Chambers of Commerce along with the City of Gatineau and the Regional Municipality of the County of Papineau suggested the high speed rail line should be built in the same corridor and at the same time as the proposed Highway 50, linking Montreal and Hull on the North Shore. In this way, they argued, the cost and duration of construction of both projects could be significantly reduced.

The Ottawa-Hull/Toronto route option was not the subject of much debate apart from the need to provide HSR service to Kingston.

In the Toronto-Windsor segment of the Corridor, cities like London, Chatham, Hamilton, Kitchener and others in Southwestern Ontario expressed their interest and concern for the eventual choice of HSR

route. Some participants favoured the North main line through Kitchener and Waterloo. Others favoured the South main line route through Hamilton and Brantford.

Generally, almost all participants favoured a downtown to downtown service between Windsor, London, Toronto, Kingston, Ottawa-Hull, Montreal and Quebec City for competitive travel times.

In addition, a number of participants from intermediate cities favoured station stops in their communities. Within the Montreal-Quebec segment, the Mayors of Trois-Rivières and Laval both favoured a station in their respective municipalities and acknowledged not all trains might stop.

In the Montreal-Toronto segment, the Cities of Belleville, Cornwall, Kingston and Oshawa all desired an HSR station. Similarly, in the Windsor-Toronto segment, the Cities of Hamilton, Kitchener, Waterloo, London and Chatham would welcome a station site. Representatives from the Niagara Peninsula area reminded the Task Force that their communities would need convenient access to the HSR line.

Both the Mirabel and the Pearson Airports would be the likely candidates for station stops in order to serve international travellers. Hamilton Airport was also mentioned.

2.3.3 Technology

The comments by participants with respect to HSR technology, made reference to speeds, specific technologies, use of right-of-way and trackage, and the status of technology development.

The relative merits of the different 200 kph and 300 kph technologies were frequently addressed by the participants. It is probable that the specific proposals for the TGV technology, made public by

Bombardier, and the Sprintor, made public by Asea Brown Boveri (ABB), contributed to the enthusiasm of the participants for comment.

The 200 kph option and/or the Sprintor were supported by 9% of the participants. The 300 kph option and/or the TGV were favoured by 21% of the participants to the Public hearings.

The 400 kph option was the least frequently discussed. The general impression expressed by the participants was that future commercial application of the Maglev technologies would still require significant research and development. In addition, some participants referred to the potential of the TGV technology to provide higher commercial speeds: in this context, a TGV World record of 515.3 kph was established on May 18th, 1990.

Several participants instead expressed the technology requirements in terms of desired travel times which would make the high speed rail service competitive with the other modes in the Corridor.

One of the features differentiating the Bombardier and ABB proposals is related to right-of-way and trackage. Asea Brown Boveri claimed the Sprintor could achieve competitive travel times on existing trackage by using its integrated banking system. On the other hand, Bombardier proposed the use of existing rights-of-way, using either abandoned or active routes but with dedicated track in order to allow its equipment to reach its maximum speed of 300 kph. It is recognized that the use of dedicated tracks is essential at such speeds.

The possibilities and problems of sharing rights-of-way and track with freight rail traffic were addressed by some participants, particularly CN Rail and CP Rail.

Those participants who addressed the issue unanimously stressed the importance of adopting proven technology. It was said that the Canadian population cannot afford the risk and cost of research and development in this field and that the best available technology should be selected from offshore, state-of-the-art, proven, leading-edge technology. In addition, it was suggested that provisions should be made to eventually benefit from future technology improvements.

2.3.4 Financing

Generally, most of the participants who discussed this aspect were in favour of a joint public/private funding formula. Public funding would be shared between Federal and Provincial levels of government. With the exceptions of the City of Hull, the Montreal Urban Community and the City of Trois-Rivières, no municipal government volunteered a role in the financing of high speed rail. However, some municipalities would consider the possibility of contributing towards improving access to stations, parking spaces and other station related infrastructure.

The opposition to a public/private funding formula came from the bus industry which opposed any subsidies for an HSR project, and the Ontario Federation of Labour which suggested full public financing.

However, a significant number of the participants would only support this project if the operation is profitable and privately operated.

The Bombardier proposal stated that public funding would be needed for major infrastructure components such as grade separation structures, acquisition of rights-of-way, roadbed and other related long term investments. Their proposal indicated a public funding requirement of $ 1.6 billion. The balance of the $ 5.3 billion estimated for the Toronto-Quebec segment would be financed by the

private sector. Operating and maintenance costs would be privately managed. The Bombardier pre-feasibility study included a financial analysis which supported these conclusions.

Asea Brown Boveri stated that its proposal would be a privately funded and operated project. They estimated the total cost of their project at $ 3 billion for the entire Windsor-Quebec corridor.

Representatives of Bergeron, Gaudreau & Pinet, Barristers, suggested a potential source of additional revenue should be considered as a means to increase the profitability of an HSR operation. Package express and mail service could be performed on the HSR trains. Mr. Howard Davy, a private citizen, the Think Rail Group, and the Association of Quebec Builders of Roads and Major Works also made similar suggestions.

2.3.5 Operation

The vast majority of participants who addressed the issue of operating the high speed rail service favoured a private operator with sufficient flexibility to ensure the profitability of the system. Among the participants, only the Ontario Traffic Conference favoured a public operator, while the Ontario Federation of Labour proposed a revitalized VIA Rail as the operator of choice.

More often, VIA Rail was not perceived by the participants as a potential successful operator. Several participants associated VIA Rail with institutional constraints and inefficiencies which would be detrimental to a market-driven operation.

The future role of VIA Rail, described by the participants, was instead frequently related to regional and connecting rail services as feeders to high speed rail.

Finally, several participants recommended that HSR operation should be designed to offer a combination of express non-stop trains, with semi-express and local trains to provide the occasional HSR stops requested for intermediate cities.

2.3.6 Implementation of High Speed Rail

The vast majority of participants expressed the urgent need for such a system. For transportation reasons, such as airport congestion, for economic reasons such as development and export of Canadian know-how, and for political reasons, such as national unity, they argued the project, if economically sound, should proceed without further delay.

Several municipalities in the Windsor-Toronto segment of the Corridor, would prefer a lower speed 200 kph technology be implemented in a first step. They suggested that if the experience was successful, they would support the necessary investment in project using 300 kph technology. They also suggested that the Montreal-Quebec segment be built after the core Corridor between Toronto, Ottawa-Hull and Montreal. This would be acceptable to the Mayor of Quebec City and the Quebec Urban Community, providing there is first a commitment for completion of the entire Windsor-Quebec corridor.

The Coalition of Corridor Mayors strongly recommended that the governments of Quebec and Ontario should continue to assume leadership in the HSR project. The Coalition also urged the provincial governments to create a plan which would make HSR operational by 1995 or sooner.

2.4 Impacts of HSR on Transportation Modes

Many participants expressed their views on the impact of a high speed rail service on the other transportation modes. The desire that these modes should complement HSR was repeatedly emphasized.

2.4.1 Complementarity of the HSR

The vast majority of participants insisted that the introduction of HSR should provide an opportunity to create a fully integrated passenger transportation system. They proposed an improved interface between the various intercity transportation modes through convenient connections and multimodal terminals. It would also involve proper integration and coordination with local transit systems, such as GO Transit, as well as with the subway systems of Montreal and Toronto, and the busway in Ottawa.

The possible linkages between the HSR and the various airports in the Corridor were frequently mentioned in the context of a fully integrated system. No consensus could be drawn from the opinions received, as some favoured direct HSR service to airports, such as Pearson and Mirabel, and others favoured intermodal links or shuttle services linking airports to the nearest HSR station.

Mirabel Airport was the most extensively discussed and, a number of participants argued that the HSR route between Montreal and Ottawa-Hull should include a station at Mirabel Airport. The Regional Municipality of Hamilton/Wentworth suggested that an HSR link with Hamilton Airport should be evaluated. References to the Windsor, Quebec and Gatineau Airports were also made.

Finally, some participants, including the Mayor of Trois-Rivières, reminded the Task Force of the need for convenient connections to the United States and Amtrak services.

2.4.2 Impacts of HSR on Conventional Rail

A number of participants suggested that, when HSR is introduced, VIA Rail's current services in the Corridor should be converted to connecting services to the intermediate cities which are not served directly by HSR. The Quebec Union for Conservation of the Environment recommended that the VIA Rail long distance services should be abandoned since those generate most of VIA's current deficits.

Other participants, such as the Kingston Area Economic Development Commission, recommended that the current VIA services should be used as regional feeder to the HSR system. This idea was supported by the City of Montreal, Metro Toronto, the Alexandria Save the Train Committee, the City of Cornwall, and by Mr. Howard Davy, a private citizen. However, the Quebec Union for Conservation of the Environment recommended that the regional rail service should be replaced by bus services. Other participants also favoured a bus system as the feeder to HSR.

The Bombardier pre-feasibility study concluded that the current Corridor rail market share of 10% would increase to 29% with the implementation of HSR in the Toronto-Quebec corridor.

Both CN Rail and CP Rail expressed their views on the impacts of HSR on their respective freight rail business. The railway companies operate in a highly competitive freight market. As the Bombardier and ABB proposals had described the possibility of using existing rights-of-way, and even existing track, CN Rail and CP Rail submitted their concerns that the potential to share lines or to consolidate traffic by rail rationalization would need to be evaluated objectively.

2.4.3 Impacts of HSR on Automobile

Several participants were convinced that the implementation of high speed rail service would significantly reduce highway congestion, as they anticipated that HSR ridership would come mostly from automobile users. The Bombardier pre-feasibility study had concluded that the automobile market share would decrease from 67% to 52% between Toronto and Quebec City if HSR was implemented.

The Association of Quebec Builders of Roads and Major Works reported the following study results: that by the year 2000, automobile traffic is estimated to increase by 75% and truck traffic by 140%, compared to 1985 levels.

The Coalition of Corridor Mayors also quoted study results to the effect that, in the United States, 12 billion hours/year would be lost due to urban congestion by the year 2005. Similar socioeconomic benefits of reduced road traffic were emphasized by a number of other participants. They said that reduced highway congestion would increase road safety and, consequently, would reduce the related accident costs. The Windsor section of the Consumers Association of Canada claimed that higher road maintenance costs would be incurred if HSR was not implemented. The United Counties of Prescott and Russell also stated that HSR is the answer to costly deterioration of roads.

Finally, the Regional Municipality of Waterloo even made the specific recommendation that Highway 401 should not be widened to three lanes between Milton and Kitchener, if HSR is introduced.

2.4.4 Impacts of HSR on Bus

The negative impacts were more emphasized by the various Bus Owners Associations which participated in the Public Consultation Process.

The Canadian Bus Association, the Ontario Motor Coach Association, and the Quebec Bus Owners Association claimed that the bus industry would be significantly affected by the implementation of a high speed rail service, particularly if it is subsidized. In addition, the Quebec Association claimed that regional bus services would then require direct subsidies since the current system of cross-subsidization would no longer be workable. They explained that this arrangement allows recuperation of losses incurred on regional services from the revenues from the more profitable corridor routes, such as Montreal-Quebec City. The Bus Associations anticipated a significant decrease in users for the city-pairs served by HSR.

A number of participants were, however, of the opinion that HSR would generate benefits for the Bus industry. For them, the industry would benefit by instituting services to intermediate cities not served directly by HSR, and by organizing extensive regional bus feeders to the HSR. The Quebec Union for Conservation of the Environment recommended that regional rail services should be replaced by bus across Canada. The Bombardier pre-feasibility study concluded that the bus share of the Toronto-Quebec City market would remain at about 9%.

2.4.5 Impacts of HSR on Air

Most of the participants who commented on air matters were convinced that the implementation of high speed rail service would reduce airport congestion, or would, at least, alleviate it. On the other hand, the Quebec Bus Owners Association claimed that HSR would not relieve air congestion.

The Montreal Urban Community was concerned for the possible effects of HSR on airport use. This was further illustrated by the Greater Montreal Convention and Tourism Bureau who suspected that HSR could

increase the number of international flights at Pearson Airport, possibly at the expense of Mirabel.

The Bureau of Competition Policy suggested that the air industry would react to a new HSR competitor, in order to maintain its clientele. The Bombardier pre-feasibility study, using an HSR fare at 50 to 60% of air fares, concluded that the air market share would decrease from 14% to 10% in the Corridor after the implementation of high speed rail service. On the other hand, the Windsor Chamber of Commerce claimed HSR would place Windsor in a competitive position to attract flights out of the United States market. In the same vein, the Coalition of Corridor Mayors quoted study results to the effect that, in North America, air trips are forecast to increase by 68% by the year 2001, with a corresponding 29% increase in the number of flights.

Finally, some participants made specific recommendations concerning the air mode. Transport 2000 Quebec and the Ontario Motor Coach Association argued the air industry should concentrate on long distance trips. The Regional Municipality of Peel and the Quebec Union for Conservation of the Environment said short flights should be replaced by HSR. The Regional Municipality of Peel also recommended that airlines should have to bid for the use of runways at congested airport terminals. Finally, Mr. Dale Martin, a Metro Toronto Councillor, recommended that prior to making any decision to expand air transportation services, HSR should be considered as an alternative investment.

2.5 The Socioeconomic Impacts

In general, the participants to the Public Consultation Process recognized that positive socioeconomic impacts would be generated by a high speed rail project. The sectors of the economy which would be affected were frequently identified but seldom in quantitative

terms. There was consensus that the socioeconomic impacts have to be taken into account in an overall assessment of the project in order to develop a complete picture and as justification for any public contributions to the project. Some participants, like the Chambers of Commerce of Montreal Metro and Quebec Metro, had considered or were undertaking impact studies for their respective areas. Others, like the Coalition of Corridor Mayors, emphasized the necessity of a thorough cost-benefit analysis and a detailed socioeconomic impact study of a high speed rail project.

2.5.1 Impact on the General Economy

The impact on the overall economy was the most frequently voiced by the participants. The former Ontario Minister of Transportation emphasized, for example, that intercity transportation is vital to the economic development of the country, and to its competitiveness in a global market context. He added that closer links between communities constitute a prerequisite for economic development.

Several participants considered an HSR project as an instrument to stimulate regional economic development. The Montreal Urban Community envisioned the project as an area development tool.

The Coalition of Corridor Mayors defined the Windsor-Quebec corridor as the «economic engine of the country». Indeed, a number of other participants supported the idea that the project would be of benefit to all Canadian regions. The Chairman of the National Capital Commission described HSR as a «barrier-free instrument in nation building».

The Mayor of Montreal, while attending with the Coalition of Corridor Mayors, quoted figures on the value of time lost in North American urban congestion at $ 250 billion U.S. per year by 2005, and in airport delays at $ 15 billion U.S. per year by 2001. It was argued

that by reducing highway and airport congestion, HSR could contribute to more efficient use of time for all the travelling population and could eventually lead to reduced transportation costs for both passengers and freight, whatever their means of travel. The train would also provide a comfortable working environment for the business traveller, superior to that offered by any competing mode, thereby enhancing the value of travel time.

Certain submissions continued in the same vein, stating that reduced highway congestion would lead to safer use of roads, fewer accidents and savings to society in injury and health costs. The Association of Quebec Builders of Roads and Major Works suggested that a 10% reduction of accidents on Quebec roads would save $ 200 million per year in material repair costs, not including the related reduction in the numbers of dead and injured.

It was pointed out by several participants that HSR has an impeccable safety record. The Shinkansen has operated in Japan for 25 years without a single fatality among its billions of passengers. The TGV in France has matched this faultless performance in the 9 years of its service.

2.5.2 Impacts on the Tourism Industry

Impacts on the tourism industry were the second most often raised by participants. While they were unable to quantify the size and the value of HSR's impact on tourism, they were all convinced it would have a massive affect on their communities.

They suggested that HSR would be a tourist attraction in itself, at least for the first years of its operation. It would also generate additional visitors from all over Canada, from the United States and, to a lesser extent, from Europe, making the many tourist attractions in the Corridor much more accessible. Specifically mentioned were

such locations as the Basilica at Ste-Anne de Beaupré, the Mount Ste-Anne Park, Quebec City, the Sanctuary of Notre-Dame-du-Cap, the cities of Montreal, Ottawa and Toronto, and Niagara Falls.

Metro Toronto reported the threatened loss of convention tourist business due to Pearson Airport's congestion, which could be alleviated by HSR. The Mayor of Windsor claimed that HSR, along with the expansion of the Cleary International Centre, would make Windsor a more competitive convention destination. However, the Greater Montreal Convention and Tourism Bureau did not foresee any increase in business-related tourism for the Montreal area which would be generated by HSR.

A representative from the United Counties of Prescott and Russell pointed out that there could be a negative impact of HSR on tourism in the smaller cities, on the assumption that the train would pass them by on its way between the major centres.

Nevertheless, the Alliance of Canadian Travel Associations (Ontario) claimed the tourism industry needed and deserved the boost that HSR would provide.

2.5.3 Impacts on the Transportation Manufacturing Industry

The potential impacts on the industrial sector, and particularly the transportation manufacturing industry, were raised by many participants from both the business and municipal communities. They said that irrespective of the technology selected, significant technology transfers would be involved in the implementation of a high speed rail system.

Bombardier, for example, proposed a Canadian content of 85% for the TGV technology it promoted, and ABB contemplated a Canadian content of 80% if its Sprintor technology is adopted for the Corridor.

Canadian firms, particularly in the Windsor area, had already started exploring opportunities to supply components and parts. It was pointed out that HSR would stimulate research and development in the high tech sector and would permit the development of Canadian know-how and expertise which could eventually lead to significant export opportunities.

The Windsor-Quebec corridor was often described as a «showcase» which could earn Canadians the opportunity to share in the potentially massive U.S. market for HSR systems. Bombardier estimated this market at $ 200 billion U.S. over the next 20 years, if all of the 22 corridors currently being studied in the United States had high speed rail systems installed.

The company said that, once in operation, a Canadian high speed rail system would generate 1,250 full-time positions and create indirectly a further 1,000 to 1,500 jobs.

2.5.4 Impacts on the Construction Industry

The impact on the construction industry would be significant. The Association of Consulting Engineers of Canada estimated that a total of 75,000 person-years of work would be created during a 3 to 10-year implementation phase. This was consistent with the estimates produced by Bombardier and ABB. The Association of Quebec Builders of Roads and Major Works forecast that an impact of $ 200 million per peak year (3,000 to 4,000 jobs) would be generated in Quebec alone, but that this was easily achievable as it would only represent 5% of the annual revenues of the Quebec industry. The Electrical Contractors Association of Ontario claimed that all electrical contractors from Windsor to Quebec City would benefit from the HSR project, particularly the 3000 currently unemployed electricians in Ontario.

2.5.5 Impacts on the Agricultural Sector

The impact on the agricultural sector was not overlooked. The United Counties of Prescott and Russell suggested that the rural population would be prepared to accept the inconveniences related to a high speed rail project in exchange for improved travel conditions. The Windsor/Essex County Development Commission claimed the HSR project would generate local benefits by enabling a diversification of the agricultural base. However, the County of Kent claimed the project would offer no positive incentive to productive agricultural communities, saying that if a new right-of-way is used, opposition should be anticipated to the loss of highly productive farmland and to the disruption the new right-of-way would cause.

2.5.6 Impacts on Government Revenues

The Association of Quebec Builders of Roads and Major Works claimed that a minimum of 33% of any HSR project cost would be returned to governments as revenue through the various applicable taxes. The Association also suggested a thorough study of this matter should be considered by the Task Force as a part of a complete assessment of the project and government's role in it.

2.6 Environmental Impacts

Those appearing before the Task Force on environmental matters focused on a number of specific issues including land use, pollution, energy consumption and, to a lesser extent, noise and vibration. Further, the notions of «quality of life» and «sustainable development» were referred to on many occasions and not only by environmental groups but also by municipal, private enterprise and consumer representatives.

2.6.1 Land Use

It was commonly accepted by the participants that rail is the most efficient mode in terms of its requirement for land. Bombardier provided estimates that 25 km^2 would be required for its TGV project in comparison with the 80 km^2 that a highway along the same corridor would need. Metro Toronto, among others, stressed the importance of making the best use of land space when planning for intercity transportation. Transport 2000 Ontario also described rail as the most land-efficient mode.

The major land-related concern, however, is with agriculture and farming. The County of Kent vigorously expressed concern that a new rail line would not only cause the loss of productive farmland but sever farm properties and break-up community neighbourhoods. The same concern was reiterated at the municipal meetings held in London, Kitchener and Cobourg: that roads, hydro lines and railways already constitute enough barriers and obstacles to farmers, at least in Southwestern Ontario and that the HSR project would incur serious opposition if a new right-of-way was proposed on the Windsor-Toronto segment.

The Canadian Institute of Planners recommended a route selection which would take land of lesser agricultural value for either a new line or even for an existing right-of-way that might be straightened and improved. While the ABB proposal does not involve new rights-of-way, since the Sprintor would run on existing track, Bombardier claimed its project would not need much new land as they intended, as much as possible, to use abandoned or existing railway lines.

2.6.2 Pollution

It was generally recognized that the rail mode, particularly with electrification, is the least polluting and the most environmentally

friendly mode. Several participants, including representatives of municipalities, business, labour, environmental groups as well as individuals claimed that a high speed electrified train would significantly reduce carbon dioxide, nitrous oxide and volatile organic emissions; all due to the reduction in road traffic.

An exception was the Quebec Bus Owners Association who claimed bus as the mode of transport which pollutes least. The Association insisted that intercity bus service could be as energy efficient as any of its competitors.

2.6.3 Energy Consumption

In claiming bus as the most energy-efficient mode, the Quebec Bus Owners Association provided the following comparison:

MODE	MEGA-JOULES PER PASSENGER/KM
Bus	0.8
Auto	2.4
Rail	2.4
Air	3.0

This claim was supported by the Canadian Bus Association which provided similar data, and by the Quebec Union for Conservation of the Environment which stated that Light Rail Transit (LRT) and bus are more energy efficient than high speed rail technology.

Several participants, however, including the Consumers Association of Canada, Transport 2000 Ontario, and the City of Montreal, claimed the rail mode would reduce energy consumption. The City of Kitchener emphasized an electrified high speed train would use the least amount of non-renewable, fossil fuel energy sources.

2.6.4 Noise Level

Only a few participants addressed the noise issue. CN Rail suggested that noise could be a significant problem for HSR, particularly in urban areas. Mr. Dale Martin, a Metro Toronto Councillor, suggested that barrier walls through residential neighbourhoods might be a satisfactory response to both the visual pollution, and at the same time be a solution to the problem of noise.

2.6.5 Quality of Life and Sustainable Development

The notions of «Quality of Life» and «Sustainable Development» were much in the minds of many of these appearing before the Task Force. They were usually tabled as arguments to change attitudes towards the environment. It was said that concern for the environment must be addressed through rigorous analysis of the environmental impacts of the various transportation modes. Certain participants, including the City of London, insisted that rail would prove the most attractive in this context. Mr. Ross Snetsinger, a private citizen, suggested that electric high speed trains would be one of the most practical ways to confront the problems of air pollution and runaway energy consumption.

Overall, HSR was perceived as the most environmentally sound transportation system. Environmental organizations argued that current government subsidies favour the air and automobile modes. The Quebec Union for Conservation of the Environment estimated the subsidy to each car owner at $ 5,000 per year. They suggested governments should consider transportation policies more appropriate to protect the quality of life and the concept of sustainable development.

2.7 The Interim Passenger Rail Situation

Many of the participants at the Task Force hearings made a point of expressing their opinion on the VIA Rail service reductions made effective on January 15th, 1990. Their views were put with such vigour, that it is considered fitting to record them, even though the issue was not included in the Terms of Reference given to the Task Force.

2.7.1 VIA Rail Service Reductions of January 15th, 1990

Most of the participants who addressed this issue were opposed to the recent cutbacks and they were convinced there should be no further service reductions. The City of Drummondville and the City of Cornwall favoured maintenance of current services. The Mayor of Montreal claimed that an acceptable level of rail service should be maintained in order to retain a rail ridership which could be the base for a potential HSR system. The Coalition of Corridor Mayors emphasized that the HSR system would need to be incrementally developed from the services now in place. Metro Toronto reinforced this statement, suggesting that incremental improvements to conventional rail services would be the best way to move toward a «super train» like the TGV.

2.7.2 Participants' Recommended Improvement Measures to the Conventional Rail Services in the Corridor

A significant number of participants emphasized the need for improved passenger rail services in the Corridor in the short term. They felt it essential to maintain an acceptable level of service to achieve sustained ridership levels which would constitute the base for any future HSR system.

Some participants submitted specific recommendations with regard to existing rail services. Generally, they related to service characteristics, technology, financing and operations.

The **service characteristics** most remarked on included reliability— when defined as punctuality and on-time performance, frequency— through specific requests for improved schedules and, particularly, early morning trains to Toronto, and travel time— which Transport 2000 Canada and Transport 2000 Ontario said could be improved within the existing infrastructure. Accessibility was also addressed by participants to the Cornwall meeting who recommended raising station platforms to the railcar floor level and widening of railcar doors. Comfort was most addressed in relation to waiting facilities, which the City of Toronto claimed should be improved, and in relation to the needed convenience of seat reservations.

At no point did a participant to the hearings make mention of fares as a feature requiring improvement.

The recommendations involving present **technology** were mostly related to safety. For Mr. Kevin J. Egan, a private citizen, and participant at the morning meeting in London, improvements to tracks, particularly approaching major centres, are desirable in the short term. The low level of safety at many grade crossings requires improvement according to the participants at the Brockville and Cornwall meetings. Indeed, the problems and costs of grade separating passenger trains from road traffic were often referred to as an issue which required early attention.

In recognizing that the costs of operating conventional passenger rail services is a problem, the City of Kitchener resolved that the **financing** of all modes be the subject of equitable investment and should immediately be applied to passenger rail services.

More recommendations were tabled concerning the current **operation** of conventional rail services. The City of Belleville recommended operating methods should be improved by seeking labour cooperation as Amtrak is doing. This was carried further by the Michigan Department of Transportation which claimed the new cost-saving labour agreements contributed significantly to the success of their «Mainline 90» improvement program in the Detroit-Chicago corridor.

The City of London recommended the number of cars should be increased on some trains since the demand frequently outstrips capacity in Southwestern Ontario. Some participants to the Cornwall meeting recommended reducing station dwell times as a potential improvement. The participants to the morning meeting in London recommended GO Train service should be extended to London. In this respect, the City of Oshawa reported with some pride they would be served by GO Trains by the Fall of 1990.

Finally, some recommendations related to the **incremental implementation** of HSR and, particularly, the involvement of provincial governments. For participants such as the Coalition of Corridor Mayors, Metro Toronto, and the City of Ottawa, a high speed rail system needs to be incrementally built-up. In the same vein, the Federation of Canadian Municipalities recommended a massive advertising campaign to promote rail services. Dr. Bessie Borwein, a private citizen, further recommended positive programs should be designed to market passenger and freight rail services. Some participants to the Kingston meeting also recommended ridership incentive programs should be developed and implemented.

Some participants to the morning meeting held in London recommended that provincial governments should be involved in the necessary improvements to the services now operated by VIA Rail.

2.8 The Future Actions Recommended by the Participants to the Public Consultation Process

Certain recommendations were made by participants to the Task Force concerning future actions that should be undertaken in advance of the construction of an HSR system. They addressed the need for a full feasibility study, other specific studies, a complete assessment of an HSR project, actions or policies to be considered in the future, the involvement of the participants in the next step of the project and the future role of the Provinces.

2.8.1 Feasibility Study

It was recommended that a full feasibility study should be undertaken as soon as possible. The reasons given for this urgent action included the necessity of an HSR system and its demonstration value in creating an enormous export business opportunity. Participants making this recommendation included the Outaouais Development Corporation, the Canadian Bus Association, the Chamber of Commerce of Ste-Foy, the Chamber of Commerce and Industry for Metropolitan Quebec City, the City of Quebec and the Quebec Urban Community, Bombardier, Asea Brown Boveri, the Montreal Urban Community, the City of Montreal, the Chamber of Commerce of Metro Montreal, the Quebec Chamber of Commerce, and the Association of Consulting Engineers of Canada.

Generally, participants favoured joint public and private financing of the full feasibility study. The government contribution would be justified by its responsibility for transportation planning and the private involvement for handling technical problems.

2.8.2 Other Specific Studies

Various participants recommended other specific studies: the Roads and Transport Association of Canada suggested a market demand study for HSR; the United Counties of Prescott and Russell proposed an origin/destination study which should include the major intermediate points; the Quebec Bus Owners Association and the Ontario Motor Coach Association stressed the need for a detailed study on the most effective means of providing the necessary transportation services and to determine if an HSR investment would be justified if its costs were fully recovered from its users. The Coalition of Corridor Mayors recommended a detailed socioeconomic impact study should be conducted. The Association of Quebec Builders of Roads and Major Works suggested a thorough study of the revenue in taxes returned to government through an investment in HSR. Pollution Probe suggested that a carbon tax should be explored as a means to reduce car use and to raise funds for the development of HSR. The Quebec Union for Conservation of the Environment went even further in this respect, by recommending that a carbon tax be dedicated to the implementation of HSR.

2.8.3 For a Complete Assessment of the HSR Project

Recommendations made by some participants aimed specifically at ensuring a complete assessment of an HSR project. The Regional Municipality of Hamilton/Wentworth suggested the Task Force study should include the impact and potential of adding the Mississauga/ Niagara Falls market to the Windsor/Quebec route evaluation. The Alexandria Save the Train Committee suggested the Task Force should seek advice from the European experts on the reduced profitability of regional rail services which could be anticipated from high speed rail implementation. Also, the Committee urged the Task Force not to ignore the smaller communities. The United Counties of Prescott and Russell suggested a weighted distance criteria should be used

to select the best station locations. The City of Gatineau, along with the Quebec Chamber of Commerce and the Outaouais Chamber of Commerce proposed a study of the possibility of locating the new HSR right-of-way alongside Highway 50 between Montreal and Hull, since this road construction is expected to take place within the next five years. The City also suggested a study of the possibility of a suburban station in Gatineau. CP Rail stressed the need to evaluate objectively the possibilities for rationalization of railway operations.

2.8.4 Actions or Policies to be Considered in the Future

The City of Toronto encouraged the creation of a rational action-oriented plan for the implementation of improvements to existing services. The Ontario Traffic Conference claimed that a national transportation policy is urgently needed and that legislation should be introduced, of the kind which supports Amtrak in the U.S.. Mr. D.J. Fader, a private citizen, suggested an entirely new organization should be created to operate trains and buses as part of an integrated transportation system. The City of Gatineau recommended setting aside the lower speed 200 kph option in the next step of HSR study. The Coalition of Corridor Mayors recommended the creation of a plan which would initiate HSR construction by 1995 or sooner. Dr. Bessie Borwein, a private citizen, suggested establishing a policy which would discourage car use and would actively encourage the use of public transport. The Federal Bureau of Competition Policy recommended reforms aimed at economic regulation of the bus industry, and the establishment of an efficient cost recovery policy for all the modes, particularly for highways.

2.8.5 Involvement of the Participants in the Next Step of the Project

The Montreal Urban Community claimed their participation, as well as representatives of all the major Corridor communities, in a full

feasibility study is essential. The Canadian Paraplegic Association (Ontario) stressed the necessity of involving disabled consumers at all stages of planning and development of the HSR project. The Coalition of Corridor Mayors emphasized that they must be involved in the decision-making process.

Other participants specifically offered their cooperation in various capacities. They included, the Electrical Contractors Association of Ontario, the MRC Côte-de-Beaupré, the Greater Montreal Convention and Tourism Bureau and the City of Laval.

2.8.6 Future Role of the Provinces

The future role of the Provinces was addressed by the Coalition of Corridor Mayors who said Ontario and Quebec should continue to assume the leadership in an HSR project. Some participants to the meeting held in Cobourg even suggested the provincial governments should take over the national passenger rail system.

Mr. William Wrye, former Ontario Minister of Transportation, publicly stated that the Task Force report would need to provide governments with a sense of the needed balance between all transportation modes as part of short-term strategies for rail service improvement and as part of the long term plan for HSR.

2.9 Other Issues

This section essentially includes issues not specifically reported elsewhere, such as profitability and costs, opportunity cost and subsidies, the roles of the federal and provincial governments and the impact on freight rail operations.

2.9.1 Profitability and Costs

The most frequently addressed issue related to profitability and costs of an HSR system. The estimated cost of Bombardier's Canadian TGV project is $ 5.3 billion for the implementation of the system between Toronto and Quebec City. The company spoke of putting together a consortium on the basis that its project would be profitable and attractive to partners providing governments contribute some $ 1.6 billion of the total. Asea Brown Boveri proposed its Sprintor system at an estimated cost of $ 3 billion for the whole distance from Windsor to Quebec City, including $ 1.8 billion from Toronto to Montreal. ABB expected the Sprintor could be entirely privately financed. The Think Rail Group proposed a TRG Train, a 200 kph electric train on existing rights-of-way but dedicated tracks, which would cost $ 2 billion. Mr. Ross Snetsinger, a private citizen, advocated a three-tier HSR, regional and local rail system, which would hopefully serve both large and small communities at no public cost. The Ontario Motor Coach Association proposed that an exclusive bus roadbed paid from existing fuel taxes would cost less than an HSR system and could still provide equivalent services at only a slightly lower speed.

As the Bombardier project had been announced prior to the Public Consultation Process, several participants were able to express their opinion on the proposal. In general, favourable comments were made that the TGV project is likely to be viable. On the other hand, the Quebec Bus Owners Association had concluded on the basis of its analysis that the estimated cost of $ 5.3 billion for the TGV project is not realistic and is somewhat underestimated. In addition, the Association claimed that the assumed ridership at 12,200 passengers/day does not justify the investment. Along the same lines, Metro Toronto emphasized that an HSR project must be implemented at a cost that does not run into billions of dollars.

Some participants submitted specific suggestions to increase the profitability of the HSR system and to reduce its implementation costs. The Mayor of Montreal recommended that sufficient flexibility be given to a future operator to ensure the profitability of the system. The idea that package express and mail service should be considered as revenue sources of the overall system was supported by the Association of Quebec Builders of Roads and Major Works, by the Think Rail Group, by Mr. Howard Davy, a private citizen, and by Bergeron, Gaudreau & Pinet, Barristers. The Chamber of Commerce of Ste-Foy suggested that profits generated by technology gains should be partially reinvested in the Canadian HSR.

The Quebec Chamber of Commerce, the Outaouais Chamber of Commerce, the City of Gatineau, and the Regional Municipality of the County of Papineau claimed that reduced costs could be derived from combining the HSR works with the construction of Highway 50 between Buckingham and Mirabel.

CN Rail suggested that additional costs would be unavoidable if HSR shares track with higher maintenance freight operations or even if HSR shares only the rights-of-way with freight traffic. Both CN and CP Rail noted that the signalling systems would probably become inoperable because of the electromagnetic affects of 25 kv electrification. As a consequence, they anticipated that new automatic train control systems (ATCS) would be required.

2.9.2 Opportunity Cost and Subsidies

Several participants stressed the need to take into account the opportunity cost of the investment which would otherwise be required in the other modes if an HSR system was not implemented. According to the representatives of Transport 2000 Quebec, the Chamber of Commerce of Ste-Foy, the Chamber of Commerce and Industry of Metropolitan Quebec City, the City of Toronto, Metro Toronto, the

City of Montreal, the Quebec Chamber of Commerce, the Association of Consulting Engineers of Canada, and the Coalition of Corridor Mayors, the assessment of the feasibility of an HSR project should take into account the fundamental issues of modal equity and opportunity cost. In this respect, the Roads and Transport Association of Canada (RTAC) acknowledged the importance of studying the modal investment choices.

As far as subsidies are concerned, it was suggested by the Consumers Association of Canada that consumers know their tax dollars contribute to all the transportation modes and that no system is totally self-sufficient. The Quebec Union for Conservation of the Environment stressed that current government subsidies favour the air and automobile modes and suggested that current VIA Rail subsidies should be used to build the HSR system. Pollution Probe emphasized the HSR concept is facing a major obstacle in the massive subsidies enjoyed by car owners which are estimated at $ 5000 per year for each car owner. CP Rail said that market distortion caused by public-paid facilities must be neutralized and that tax reform is needed to balance the rail mode situation relative to the other modes.

Some participants went further by recommending user charges, as proposed by the Canadian Bus Association, the Quebec Union for Conservation of the Environment, Dr. Bessie Borwein, a private citizen, and by the Federal Bureau of Competition Policy.

2.9.3 Roles of Federal and Provincial Governments

The relationship between the two levels of government and their respective transportation responsibilities were the subject of certain submissions. It was said that the federal policy seems to be aimed at getting rid of all trains. It was also pointed out that federal funding assistance will be required to implement HSR, and

that the federal government should be represented on the HSR Task Force.

It was suggested that the provincial governments should be more involved in rail services to regional areas and in grade-separation projects, and in breaking down the restrictive registration and licencing barriers between Quebec and Ontario. However, in financing the HSR project, along with the private sector, Ontario and Quebec must continue to assume the HSR leadership. Concern was also expressed about generating sufficient provincial financial support for both VIA Rail and HSR.

Finally, it was proposed that all levels of government could eventually support the HSR system by instituting policies to encourage the use of HSR by their respective employees.

2.9.4 Impacts of HSR on Freight Rail Operations

The Chamber of Commerce of Metro Montreal stressed that an HSR system must not be implemented at the expense of the freight rail carriers. The Coalition of Corridor Mayors mentioned that HSR would benefit the freight operations of CN Rail and CP Rail. Mr. Kevin J. Egan, a private citizen, recommended that HSR interference with freight traffic must be taken into account. Finally, at the meeting held in Cornwall, it was mentioned that any duplication of the existing CN and CP lines is unacceptable.

2.10 Observations

The Ontario/Quebec Rapid Train Task Force acknowledged the valuable advice received during the Public hearings and expressed sincere appreciation to all the individuals who contributed to the success of the Public Consultation Process.

The written material which was provided and the ideas which were generated through the numerous exchanges were very much appreciated by the Task Force and, without question, did influence the Members' findings and recommendations.

It is clear that considerable public support exists for improved passenger rail services within the Windsor-Quebec corridor. This support exists because of the positive impact that the service would have in terms of economic and associated social development.

There is a consensus among those who addressed the Task Force that an entirely new high speed passenger rail service is a perfect prescription to prepare Canada for the 21st Century.

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3. HIGH SPEED RAIL ABROAD

3.1 Introduction

High speed trains were developed as a solution to the saturation of the passenger rail and freight rail networks. They have, at the same time, contributed to reducing airport and highway congestion, diminishing atmospheric pollution, improving energy efficiency and enhancing safety.

These trains are in operation in Japan, France, the United Kingdom, Italy, Sweden, and the United States. Others, of advanced magnetic levitation technology, are in experimental stages in Germany and Japan.

High speed trains have had major impacts on the countries which put them into operation. All of these countries have added to or are planning to add new high speed links, some of them across national borders. Elsewhere, Australia, Switzerland, Austria, Denmark, Greece, Ireland, Spain, Brazil, Russia, Korea, Czechoslovakia, Yugoslavia, and the United States are looking at the possibility of importing newer technologies, or of further developing their own technology in order to implement high speed rail.

Each high speed rail system, operated within national boundaries, has technical differences to suit the local geography, the existing transportation systems and the demands of the travelling public. Their technical characteristics are listed in Appendix «C».

They also share some characteristics which are common to all high speed trains:

Speed - the trains provide downtown-to-downtown travel times which are competitive with those of airline services and automobiles.

Safety - the Shinkansen has carried more than 3 billion passengers since its opening in 1964, without a single accident due to operation. The TGV has also proven to be very safe, since it has not had an accident on its dedicated track since its opening in 1981.

Reliability - service delays are very rare. The average on-time performance of the Shinkansen Tokaido was plus or minus (±) 23 seconds for the operation of 280 trains per day between Tokyo and Osaka for the entire year 1989, according to the Executive Director and General Manager of JR Tokai.

Downtown stations - most stations are located downtown, providing more convenient and rapid access than airport terminals.

Higher frequency - the frequency of service is very high: the trains of Shinkansen Tokaido operate at headway intervals of four minutes during peak periods.

Comfort - the trains provide a very smooth ride in a quiet and pleasant interior environment.

Integrated systems - the trains are fully integrated with other transportation modes through convenient connecting terminals and services.

The following is a synthesis of the high speed rail experience of foreign countries, as gathered by the Task Force members in the course of their inspection tours.

3.2 High Speed Trains in Operation

The development of high speed trains has followed two different approaches: one requires an improved infrastructure with exclusively dedicated track and high performance equipment, as in Japan and

France. The other approach emphasizes equipment performance on upgraded, existing track, as in Sweden, Italy, the United Kingdom and the United States.

3.2.1 Dedicated Track Systems

3.2.1.1 The Japanese Experience: Shinkansen

The development of the Shinkansen took place as part of an overall national development plan. In the 1950's, rail capacity problems were experienced in the Tokyo-Osaka corridor and the Shinkansen was adopted as a solution. This project was financed by the government through low-interest World Bank loans and by government guaranteed loans.

Japan put the Shinkansen Tokaido train into service between Tokyo and Shin-Osaka (515 km) in 1964 reducing trip time from 4 hours to 2 hours 49 minutes. The line was extended to Okayama (161 km) in 1972 and to Hakata (393 km) in 1975, and it is operated by Shinkansen Sanyo. The maximum speed of the Tokaido and Sanyo lines is 220 kph. In 1982, two new lines to the north were opened, the Shinkansen Tohoku between Ueno and Morioka (493 km) and the Shinkansen Joetsu between Omiya and Niigata (270 km). The present maximum speed of these trains is 240 kph, but there are plans to introduce 300 kph equipment in order to maintain a competitive relationship with the airlines.

The Japanese railway system was entirely owned by the State until 1987. That year, the government proceeded with a restructuring program, organizing six geographic subdivisions, under the holding company Japan National Railways (JNR).

A Shinkansen electric train set is composed of sixteen (16) cars for through service, while trains serving all stations have twelve (12)

cars. The Shinkansen Tokaido alone carries about 100 million passengers per year. It has 85% of the Tokyo-Osaka public transportation market, compared to 15% for the airlines. The automobile and bus modes are not used significantly for the city-pair due to freeway congestion caused by heavy regional and local traffic. High freeway tolls also contribute to reducing congestion and to the success of the Shinkansen operation. For example, a journey between Tokyo and Osaka by automobile would cost approximately $ 80 per vehicle for freeway tolls. Airfares are set by the government at a level slightly higher than the rail fares.

3.2.1.2 The French Experience: TGV

French railways are operated by the Société Nationale des Chemins de Fer Français (SNCF), which is owned by the French government and has a status similar to a Canadian Crown Corporation, with the power to generate capital funding through the issuance of bonds. SNCF was experiencing track capacity problems on the Paris-Lyon corridor and decided to implement the TGV solution. The success of the TGV Sud-Est is encouraging the installation of other high speed links, such as the TGV-Atlantique, as part of an eventual system extending beyond France's borders to Spain, Belgium, Holland, Germany and The United Kingdom.

a) The TGV Sud-Est

The TGV Sud-Est links Paris and Lyon (425 km) at a maximum speed of 270 kph. Inaugurated in 1981 and, completed in 1984, it reduced the travel time on this route from 4 hours to 2 hours.

The trains are composed of two power cars and eight coaches in a fixed configuration since the bogies are located between the coaches in an articulated fashion. This feature reduces service flexibility but provides significant savings, mainly in rolling

stock maintenance and in maintenance of way. Two train sets can be linked together to accommodate peak traffic.

The system was financed on domestic and international markets and the return on investment is described at 15% together with an equivalent level of socio-economic benefits. The initial investment in the TGV was completely paid by 1990, one year earlier than anticipated in the original plan.

This financial success is mostly attributed to the ridership attracted by the TGV Sud-Est. An increase from 13.3 million users in 1984 to 17.3 million users in 1988 certainly represents an impressive success. SNCF is considering using double-deck cars to increase service capacity on this line. Over the same period, the rest of the SNCF network experienced a significant drop in ridership.

Meanwhile, the airlines suffered a loss of 80% of their traffic on the Paris-Lyon route at the same time that the air market increased by 80 to 100% on other domestic routes. Apart from the «TGV effect», the reduction of airline market share could be tied to fare levels. TGV fares are generally 33 to 50% of airline fares: 50% for first class and 33% in economy class. In peak periods, however, TGV fares rise to higher levels.

b) The TGV Atlantique

In 1990, SNCF inaugurated the TGV Atlantique linking Paris and Le Mans (176 km) and further expanded it to Tours reducing the travel time between Paris and Tours from 1 hour 40 minutes to 1 hour. This dedicated track service operates at a maximum speed of 300 kph.

The TGV Atlantique train is a modified and improved version of the TGV Sud-Est. While the latter uses 12 traction motors per train, the TGV Atlantique uses only 8, that is one for each axle of the two power cars. However, the use of more powerful AC auto-synchronous motors with lesser grades explains how this train can pull two more cars (in a 1-10-1 fixed consist) than the Paris-Lyon train at a speed 30 kph higher. Also, improved streamlining of the locomotives and cars has produced a 10% lower drag coefficient than its predecessor, improving on an already very good aerodynamic performance.

Project financing required government funding of 30%, with the rest borrowed on financial markets by SNCF. This government funding was also provided on the basis of the associated improvements to commuter services. The return on investment was set at 12% and debt repayment should be completed in ten years.

SNCF has a 5-year strategic plan with the government which sets out expectations and specifies the level of government support. It involves competitive equalization measures such as a contribution to infrastructure costs and a contribution to SNCF employee pensions. It also includes measures to compensate for specific public services offered, including remote services and social programs and fares for families, senior citizens, students, military personnel, etc.

The French government's transportation intervention also addresses other modes as most superhighways are toll roads and as regulations do not allow any scheduled inter-city bus system. For airline service, the government does not provide subsidies for the construction of new airports, but it owns Air Inter, the regional airline which suffered the most from the loss of business to the TGV.

3.2.2 **Upgraded Existing Track Systems**

3.2.2.1 The United Kingdom Experience: HST-125

The British government provides financing for passenger and freight train service under the responsibility of British Rail (BR). Since 1982, BR has consisted of five profit centres. One of these is Intercity, responsible for long-distance passenger travel, which is by itself one of the country's 150 largest companies.

BR operates the HST-125 high speed diesel train on several routes from London. This train can attain 200 kph on existing right-of-way shared with freight traffic.

With low axle loading and tractive power to pull 7 to 10 cars, this train has surpassed expectations regarding track maintenance costs and the commercial attraction of its service. It is a very low-cost option, requiring no electrification and fewer grade-separated crossings. Its main limitations come from being operated to the maximum in terms of speed and distance per year. As a result, its maintenance costs and the life-cycle costs of the two light locomotives are high when compared to the costs of comparable electric traction, or of less-stressed diesel engines which can achieve a maximum speed of 160 kph.

With ridership increasing substantially on the HST-125, the government decided in 1984 to authorize the electrification of the London-Edinburgh line (640 km) and put a new train into service, the Intercity-225, which can reach 225 kph. This decision was accompanied by a resolution that Intercity service should be profitable by April 1st, 1989. This objective was apparently met: Intercity's president calls it the only profitable passenger railway in the world.

Electrification of the London-Edinburgh line will save 60% on maintenance costs and 25% on energy costs. Travel time will also be reduced by about 1 hour, to 4 hours. This service will be inaugurated in May, 1991.

Investments in rolling stock over the last ten years have allowed the replacement of most of BR's aging equipment.

3.2.2.2 The United States Experience

Following the bankruptcy of many of the private companies which offered passenger rail services, the US government decided to form Amtrak, which has had exclusive responsibility for intercity passenger rail service in the United States since 1972. Set-up and development costs exceeded US $ 4 billion, and the American government subsidizes the annual operating deficit, which is decreasing each year. In 1989, this subsidy represented approximately 35% of Amtrak's revenues.

Amtrak's high speed rail experience is restricted essentially to two routes, Albany-New York and New York-Washington, which have maximum speeds of 180 kph and 200 kph respectively. However, the constraints of sharing tracks with freight traffic do not permit higher speeds.

Between Albany and New York, 23 trains shuttle 2,600 passengers per day. These turbo trains, designed by the French company ANF and built in their second generation by Rohr of California, are propelled by turbine engines. This equipment enjoys an excellent reputation because of its reliability, despite the higher maintenance costs of its turbine engine and cold-weather starting problems. It should be noted that this light rail equipment does not meet the North American standard for buff load, but special dispensation was provided by the Association of American Railroads.

Between New York and Washington, the electric Metroliner AEM7 locomotives which pull Amfleet cars have a better acceleration than the turbo locomotives. Track quality varies along the route, however. The trip between city centres takes less than 3 hours, which is competitive with airplane-plus-taxi travel time.

While the United States is not a leader in high speed rail technology, having concentrated more on public aviation, they have now more than 20 corridors under active study as high speed rail routes.

3.2.2.3 The Swedish Experience: X-2000

In Sweden, the state owns the rail right-of-way, and the Swedish National Railway Company (SJ) is responsible for operations. The railway company operates not only freight and passenger rail services, but also has interests in bus, trucking, and water transport.

SJ has operated the X-2000 train between Stockholm and Gothenburg since 1990. This train has a maximum speed of 200 kph. Running on tracks shared with freight traffic and commuter trains, the intercity passenger rail service is given priority during the day. The distance from downtown Stockholm to downtown Gothenburg is 456 kilometres. The X-2000 will gradually reduce travel time from 3 hours 49 minutes to 2 hours 55 minutes between now and 1994, as track improvements are completed. By comparison, air travel time is 2 hours 45 minutes, and automobiles take 5 hours to cover the same distance.

The main features of this train include:

- o Radial steering bogies which, by reducing lateral friction on rails, allow speeds through curves 20 to 30% higher than possible with conventional rigid bogies;

- o A dynamic tilting system on each car which allows it to move through curves at high speed without affecting passenger comfort.

For the high speed train, the contract between the state and SJ stipulates that the former absorbs the costs of improvements to track, signalling systems, crossings, and electric systems, while SJ takes care of operations and maintenance. SJ pays a user fee to the state for track use based on the equivalent charges levied on commercial highway users.

3.2.2.4 The Italian Experience: ETR-450

The Italian Railway, Ferrovie Dello Stato (FS) is a state-owned company. The state subsidizes the capital costs, operations, and maintenance of the railway. Its development and its functioning depend on policies established by the government.

Recently, the congestion of the road transport system has led the government to declare a ten-year, high-priority development program for high speed passenger trains.

FS currently operates the Pendolino (ETR-450), which reaches a maximum speed of 250 kph on tracks shared with freight trains. The first Pendolino entered commercial service between Rome and Milan in 1988, reducing the travel time from 5 hours to 4 hours.

The Pendolino is an electric train with an 11-car consist on which most axles are motorized. This train can roll through a sharp curve at a speed 25% to 30% higher than conventional trains without affecting passenger comfort, because of its dynamic tilting device. Unlike the X-2000, however, the Pendolino does not have a radial steering bogie. Lateral friction on the rails is eased by reducing the wheelbase. This solution, however, could adversely affect the stability of the bogie under certain conditions and can generate hunting and vibrations which have a negative impact on passenger comfort.

Since being implemented in 1988, the Pendolino has rapidly increased its ridership: for example, on the Rome-Florence segment, the increase has been 150% in the first year of operation. The current modal mix is 10% rail, 40% automobile, and 50% air. There are intercity buses, but their market share is negligible. The objective of the government is to increase the rail market share to 17% by the year 2000.

Under legislation in effect since January 1, 1986, the Italian government has allowed FS to become more competitive by giving it more room to manoeuvre in terms of structure, management, and activities. However, a close control is kept on the fare schedule within each mode. For example, the optimum fare between Rome and Milan should be 80% of the air fares, according to experts, but the government does not accept the application of this fare: high speed train fares are not permitted to exceed 60% of air fare, even if the downtown-to-downtown travel time is very competitive between these two modes. Government subsidies to cover the annual operating deficit represent about 70% of FS costs.

3.3 High Speed Trains at the Prototype Stage

3.3.1 Conventional Technology

3.3.1.1 The German Experience: ICE

The German rail network is state property, operated by a public enterprise: Deutsche Bundesbahn (DB).

DB hopes to put the Intercity Express (ICE) train into service in 1991 on two lines between Hamburg and Munich: Hamburg-Hannover-Würzburg-Nuremberg-Munich and Hamburg-Hannover-Fulda-Frankfurt-Mannheim-Stuttgart-Munich. A consortium was formed to implement the ICE train and includes several international companies: AFG, ABB, Duewag, Siemens, Krauss Maffei, Krupp, MBB, Thyssen Henschel and Thyssen Waggon Union.

The electric-traction ICE is composed of at least 10 cars and two power cars. Unlike the TGV, the bogies are deployed under each car, which increases the number of bogies and the unsprung mass of the train, but also permits more flexible train configurations. The axle load of the ICE is around 20 tonnes, compared to 17 for the TGV, but its builder is convinced that the dynamic forces on the track are indistinguishable from those of the TGV.

A maximum speed of 250 kph is foreseen for the ICE train in commercial service. DB also considers the possibility of raising its maximum speed to 280 kph. Under test conditions, an ICE prototype has reached 406.9 kph.

The strategy of integrating upgraded existing conventional lines with sections of new high speed track, has been selected in order to gradually increase average commercial speeds. DB foresees

building 250 kilometres of new track and improving 1,150 kilometres of existing track in order to create a high speed network.

DB is hoping for a 30% increase in ridership, mainly from automobile users. The German airline Lufthansa currently leases complete trains in order to displace shorter-distance air traffic, and it has the intention of using the ICE train in the same way.

3.3.2 **Magnetic Levitation (Maglev). Experimental Work in Japan and Germany**

Magnetic levitation is not a conventional steel wheel on steel rail technology. Maglev refers to the family of technologies which use magnetic force for lift and propulsion, while retaining the principle of a guided way. The performance of the vehicles is not limited by the constraints of contact between wheel and rail.

3.3.2.1 In Japan

In Japan, Maglev experimentation is underway with an electromagnetic system that uses high efficiency superconductivity. This work is financed and managed by the Railway Technical Research Institute, which receives its operating budget from the government and the Japanese railway companies.

Experiments with linear traction motors have been pursued for more than twenty years on a twelve (12) kilometre test track in Southwest Japan at Miyazaki. Although a straight-line speed of more than 500 kph has been attained, several performance problems have not been fully resolved, such as switching, braking, and the physiological issue of intensity of the magnetic field around the vehicle.

A new 43-km test track, partly double-tracked, is to be built between 1991 and 1994, parallel to the Tokyo-Osaka corridor. This test track will be in tunnel for more than 80% of its route. Projected expenses

for the construction and associated plant will be in the order of \$ 3.0 billion (346 billion yen) of which 77% will be assumed by Central Japan Railway, 15% by the government, and 8% by local governments in the Yamanashi prefecture.

The projected date for the entry of Maglev trains into commercial service is 2006. While its promoters plan for cost recovery, over a period of thirty years, they note the enormous socio-economic benefits, notably in time saved by passengers. The Tokyo-Osaka travel time would be reduced from 3 hours to 1 hour, and they see this performance as having great benefits for regional development and the overall Japanese economy; repeating the earlier impact of the Shinkansen.

3.3.2.2 In Germany

Germany has also experimented with and developed a Maglev system. Unlike its Japanese equivalent, the Transrapid 07 has its linear motor placed in the roadbed and the «rotor» is on board the vehicle. The simple electromagnetic system, operating on attraction rather than repulsion, provides an air-gap of only 1 cm (3/8 of an inch), whereas the Japanese Maglev lifts to 12 cm (6 inches clearance). However, the Japanese Maglev produces a magnetic field 100 times greater, which is enough to affect some electronic equipment and to raise some physiological concerns.

The German government has decided to build the first Transrapid line which would initially link the two airports Cologne/Bonn and Düsseldorf. A number of other applications of the German Maglev technology are being considered, mostly linking international airports to attraction centres such as Epcot Center at Disney World or to downtown terminals such as Pittsburgh.

3.4 The Main Lessons of International High Speed Train Experience

International high speed rail experience provides certain recurring lessons, notably that:

- Rail transportation is a state responsibility. In every case, governments make the decisions on the operation and development of rail service. In the same way, governments participate directly in the build decision and in the financing of high speed trains; either by subsidies or by loan guarantees.

- Similarly, governments assume responsibility for operating deficits, through a variety of subsidy models, such as the direct subsidies of the UK and Italy, and the indirect subsidies of France and Sweden. In the Swedish case, the government has taken over the maintenance-of-way, and levies a user charge on the railway company which operates the trains.

- High speed rail systems worldwide already use or are moving to overhead, electric catenary power. However, the technical characteristics of each high speed train do vary. Each system has been designed to suit the particular topographical and physical operating conditions in which it must serve.

- The Japanese Shinkansen, the French TGV, the Italian Pendolino (ETR-450), the British High Speed Train (HST), and the Swedish X-2000 are proven technologies.

- Service improvements have earned traveller acceptance and have led to marked increases in ridership.

- Where high speed trains have been introduced, the improvement of service levels (travel time, frequency, reliability,

convenience, comfort, safety) has created a new modal mix, and has contributed to a better balance in transportation.

- The consequent increased mobility in intercity travel has, in France and Japan particularly, encouraged regional economic development.

3.5 Other Corridors Under Study or at the Implementation Stage

The results achieved by high speed trains elsewhere have created a strong interest in their use on other routes, in North America, in Europe, and in Asia. The prospects for high speed rail are being seriously studied in numerous corridors, and extensions are either under consideration or under construction wherever systems are already in place. More important among these are:

3.5.1 In the United States

In the United States, there is a revival of interest in high speed trains, primarily due to environmental concerns and the energy consumption advantages. A powerful lobby is pressing the American government to invest in American-designed and built Maglev technology. Some U.S. $ 12.5 million research dollars have been voted and several proposed bills now awaiting approval would provide grants of nearly half a billion dollars towards the American Maglev.

In the meantime, a number of State-sponsored Commissions are studying the more attractive American corridors with a view to implementing high speed rail services within the next 10 years. Routes include Miami-Orlando-Tampa, in Florida, a high speed Maglev link between Orlando Airport and Epcot Center, the 525 km link from Las Vegas to Los Angeles, a North/South link between Anaheim and Sacramento in California, the Texas Triangle linking Dallas, Houston and San Antonio and the Detroit-Chicago-Minneapolis corridor.

A number of other projects are being considered by various States. In all, a total of twenty-three corridors are being investigated in North America, not including the Alberta corridor between Calgary and Edmonton.

From 1982 to 1985, the Quebec government, in concert with the states of Vermont and New York, completed a pre-feasibility study of a Montréal-Burlington-Albany-New York link. Since that time, the project has been on hold.

3.5.2 In France

The French government is committed to provide SNCF with $ 9 billion over the period 1990 to 1994 to expand the TGV network. It will extend northwards to Lille and the Channel Tunnel and reduce Paris-London rail travel time from 7 to 3 hours. It is intended to also extend a link to Brussels, Amsterdam, Cologne, and Frankfurt. Other planned routes will serve Strasbourg to the East and Spain in the South. By 1994, 1,261 kilometres of new track will have been built.

To accomplish these various projects, the French government, as well as local governments, will be called upon to contribute financially. For example, the City of Lille has committed half of the additional construction costs to ensure the new line will serve this city.

The TGV currently achieves a maximum operating speed of 300 kph which could be increased in the next few years. The 515.3 kph speed record set under test conditions by the TGV in May 1990 is comparable to the performance of the Japanese and German Maglev systems in their prototype form.

3.5.3 In Sweden

The Swedish government is committed to investing about $ 2 billion over the next 10 years for the construction and development of high speed passenger rail service in the country. The projects include a Stockholm-Malmö link in 1994, followed by Gothenburg-Malmö and Stockholm-Sundswall. When the high speed network is completed, it will provide direct access to 4 million people, and in all 6 million people will live within a one-hour distance of the system.

3.5.4 In Italy

The Italian government is now developing a second generation high speed train. This train will not have a dynamic tilting mechanism like its predecessor, because it will run on superior geometry dedicated tracks. The ETR-500 will be put into service first between Rome and Milan, reducing the travel time from 4 hours to 3 hours. The ETR-500 cars are built of aluminum and are pressurized to prevent the passenger discomfort which otherwise occurs at tunnel entrances. Forty-two ETR train sets will become available in 5 to 6 years; each set includes 2 power cars and 10 coaches.

The high speed train network development program includes a north-south axis from Milan to Naples, and an east-west axis from Turin to Venice. When these corridors are developed, FS envisages further extension to the south towards Puglia and Battipaglia.

3.5.5 In Germany

Germany is planning the construction of new track between Würzburg and Hannover, and between Mannheim and Stuttgart. Other trackage will be improved between Würzburg and Munich, Dusseldorf and Hannover, Hannover and Hamburg, Hamburg and Dortmund, to form a network that links the principal cities of the country. This system

will use German ICE equipment and, no doubt, will be linked with planned high speed services in France, Belgium and Italy.

3.5.6 In the United Kingdom

In the United Kingdom, British Rail is beginning to update its extensive route system of high speed diesel operations by introducing electric train sets on several lines.

3.5.7 In Korea, Spain and Australia

The Korean government has advanced its plans for high speed rail to the point of seeking competitive bids to serve a new line between Seoul and Pusan.

Spain has decided to adopt French TGV technology as the equipment of choice for its part of what could well become a European high speed rail network. The first corridor route between Madrid and Seville is expected to be in operation by April 1992, while an HSR route between Valencia and Barcelona is currently at the pre-feasibility stage.

The Australian States of New South Wales and of Victoria have been considering further improvement of the line between Sydney, Canberra and Melbourne.

3.6 Observations

Certain observations can be drawn from this review of foreign experiences, which are relevant to the opportunity in the Ontario-Quebec corridor.

The travelling public has, in each case, responded to the radical change in service that high speed trains have brought. There have

been substantial traffic increases as high speed trains have increased personal mobility. They have stimulated more numerous exchanges between the city-pairs, and have triggered economic development of cities, regions, and countries.

The deployment of high speed trains has created significant direct and indirect employment, especially to the country originating the technology. Typically, the necessary financial resources are provided in large part by governments, or are guaranteed by governments, on the basis that the overall economic return justifies the investment.

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4. THE COMPARATIVE PERFORMANCE AND RELATIVE IMPACT OF THE HIGH SPEED RAIL OPTIONS

4.1 Introduction

While the Task Force mandate was to test the feasibility of a high speed passenger rail service in the Corridor, the methods used to do so necessarily concentrated on the likely forms of high speed rail.

A comparative analysis was conducted of three generic high speed rail alternatives. The comparison illustrated their relative performance and provided estimates of costs and revenues, and projections of their social, economic and environmental impacts. However, it did not provide that information in absolutely definitive terms.

The comparative studies were designed as a means to get quickly at the financial crux of the cost and revenue relationships by illustrating the respective financial performances of the three speed options. Thus, each of the 200, 300 and 400 kph analyses attempted to relate the capital costs of their different optimal alignments with the revenues generated by their city-to-city travel times.

The demand forecasts, which were based on previous surveys of travel behaviour with respect to price, time and frequency, were also used to provide an indication of optimum fares; that is, fares which would generate maximum revenue.

Thus, the Task Force studies proceeded in a coordinated manner as the capital costs, and the travel times they bought, in turn generated ridership forecasts, revenues, required frequencies and operating costs.

These numbers were set out as cash flows and were the subject of extensive financial review to measure the prospects for commercial viability of the project. A computerized financial model was used to produce, on a discounted cash flow basis, the net present value (NPV), the return on investment (ROI) and the percentage government grant required for each of the three speed options. Importantly, the model also enabled the Task Force to test the sensitivity of each option to changes in fares, ridership and the costs of capital.

In the same vein, the very same alignments and operating strategies, on which the costs had been based, were assessed to identify both the economic impacts of the investments and the direct and indirect environmental implications.

As each option was assessed using the same basic market demand model, the same unit costs and the same financial, economic and environmental methods, relevant comparisons of their relative performance could be made in all respects.

4.2 Train Performance and Travel Time

If the comments made at the Task Force public hearings are any indication, the most important attribute of a high speed train service is speed. The ability to reduce travel times between city centres, to be competitive with the airlines over the longer distances and the automobile for the shorter journeys, is perceived as paramount.

However, in the competition for passengers, the variables of price and frequency, as well as time, together affect travel decisions. Modal choice is further complicated by the different priorities of business and non-business travellers and their respective attitudes towards the convenience and reliability of rail, air and bus services.

Nevertheless, as capital costs, service frequency, ridership, and revenues are driven by speed and travel time, it was crucial that the physical performance of each investment option be accurately calculated.

4.2.1 Train Performance Calculations

The train performance calculations for the 200, 300 and 400 kph alternatives were repeated in order to establish the highest commercial speeds, for optimum levels of capital investment. This required careful engineering analysis of the opportunities for lower-cost improvements in speed.

The calculator was programmed with the actual performance characteristics of the three representative technologies, namely the British Rail HST, the French TGV-Atlantique and the German Transrapid Maglev systems.

The calculations assumed that, on straight track, a high speed train will accelerate to maximum speed and will only slow down for restrictions of curvature or for station stops. The emphasis was on eliminating unnecessary impediments to high speeds.

The final estimates of running time between the principal city-pairs, with station stops, are shown in Table 4.1. These travel times are a reflection of what can be achieved in the Corridor bearing in mind the geographic obstacles and the speed constraints associated with the use of downtown stations in Quebec City, Montreal and Toronto. They are unquestionably competitive with the other modes and, of course, are a major improvement over the present conventional train service.

TABLE 4.1 - OPERATING TIMETABLE ESTIMATES

	200 KPH(1)	300 KPH(2)	400 KPH
Montreal-Quebec City			
Montreal-Laval Station	00:15	00:15	00:06
Laval Station-Trois Rivières	01:08	00:46	00:32
Trois Rivières-Lorette	01:54	01:15	00:56
Lorette-Quebec City	02:09	01:33	01:00
Total timetable time(3)	02:20	01:40	01:10
Montreal-Ottawa-Toronto			
Montreal-Dorval	00:13	00:12	00:07
Dorval-Ottawa	01:11	00:54	00:32
Ottawa-Kingston	02:03	01:20	01:05
Kingston-Guildwood	03:13	02:20	01:41
Guildwood-Toronto	03:24	02:33	01:50
Total timetable time(3)	03:30	02:45	02:00
Toronto-Windsor			
Toronto-Oakville	00:15	00:12	00:10
Oakville-London	01:14	00:57	00:31
London-Windsor	02:17	01:45	01:03
Total timetable time(3)	02:30	01:55	01:10

Notes: (1) Provides for 3 inches (7.5 cm) of underbalance.
(2) Provides for 6 inches (15 cm) of underbalance.
(3) Includes additional «slack» time to ensure reliable on-time performance.

4.2.2 Other Forecasts of Train Performance in the Corridor

VIA Rail's 1984 and 1989 studies produced a range of running-time forecasts for different investment levels. The «maximum role,» 300 kph equivalent, which VIA recommended in its «Review '89» Report suggested a set of city-pair times which are set out below in Table 4.2. That table also includes estimates by Bombardier for its proposed version of the TGV - Atlantique and ABB's forecasts for its Sprintor.

TABLE 4.2 - TRAIN PERFORMANCE COMPARISON

	VIA '89 (300 KPH)	BOMBARDIER (300 KPH)	ABB (250 KPH)
Quebec-Montreal	1 h 50	1 h 35	less than 2 hrs
Montreal-Ottawa-Toronto	2 h 59	2 h 40	2 h 45(1)
Toronto-Windsor	2 h 10	---	---

Note: (1) For Montreal-Toronto direct route.

While the estimates are of the same order as the Task Force forecasts, they are based on different operating assumptions for VIA Rail as will be seen later and, in the case of the Sprintor, a somewhat different technology.

ABB's claim for the Sprintor's performance between Montreal and Toronto, using existing operating rail rights-of-way, was reviewed by the Task Force using the train performance calculator simulation for this direct route. A preliminary evaluation indicates that the ABB train would take only 10 or 15 minutes longer for each route

segment (e.g. 3:00 hours for the Montreal-Ottawa-Toronto spine route) than the 300 kph option. These results suggest a more thorough analysis would be required to test the value of its steerable axle and tilt technology. However, the problems of interference between passenger and freight trains should be taken into account.

4.3 Operating Strategy Decision

In specifying the speeds, and the route and alignment characteristics to suit them, the Task Force gave preliminary definition to the operating strategies for each of the 200, 300 and 400 kph options. The city-pair travel times were used as input to the market demand models which generated the market share ridership forecasts for each Corridor segment. In turn, using HST and TGV experience for establishing seat capacity and likely load factors, it was possible to identify the required train frequency for each option, in each Corridor segment.

In this way, and by taking into account vehicle maintenance cycles, it was possible to identify the rolling stock requirements to assure reliable scheduling for each option. While fewer, longer trains would reduce the consequent operating costs, such a strategy would generate less ridership and possibly affect train performance, unless tractive power was increased.

4.3.1 Frequency and Fleet Requirements

While the Windsor to Quebec City corridor is viewed as a single entity by the Task Force, the relatively low proportion of through travel encouraged its analysis in terms of the three constituent segments: Quebec-Montreal, Montreal-Ottawa-Toronto and Toronto-Windsor.

The frequency and corresponding fleet requirements are shown for each segment in Table 4.3. More train sets are needed at higher frequency and for the longer distance segments. At higher speeds, fewer sets would be necessary if it was not for the extra riders attracted by them.

The percentage of inter-segment, or through travel, represents about 10-15% of all forecast trips and it is likely that, in order to best serve these passengers, a number of daily through trains should be incorporated into the Corridor schedules.

TABLE 4.3 - FREQUENCY AND FLEET REQUIREMENTS

	200 KPH	300 KPH	400 KPH
Quebec City-Montreal			
Frequency(1)	10	14	20
Fleet requirements(2)	(7 train sets)	(9 train sets)	(9 train sets)
Montreal-Ottawa-Toronto			
Frequency(1)	12	18	24
Fleet requirements(2)	(12 train sets)	(12 train sets)	(18 train sets)
Toronto-Windsor			
Frequency(1)	12	16	20
Fleet requirements(2)	(7 train sets)	(9 train sets)	(9 train sets)

Notes: (1) Number of trains per day in each direction.
(2) Number of train sets required in brackets.

4.3.2 Other Operating Strategies

VIA Rail proposed a lower cost, 300 kph equivalent, using a dedicated single track system with frequent double track sections to accommodate train «meets». This was paired with the concept of fewer, longer trains as a means to obtain an advantageous cost and revenue relationship. Unfortunately, this unique idea limited commercial speeds and has been described as vulnerable to compounding delays. Intended VIA frequencies varied from 6 to 15 daily trains each way for low-traffic and peak periods in the Toronto-Montreal segment.

Like VIA Rail, Bombardier proposed a dedicated track to accommodate its 300 kph equipment. However, the Company's proposal is to use a full double track system, and more often to accommodate it alongside the existing railway corridors, to mitigate the intrusion of a new right-of-way in developed areas. Bombardier's suggested frequency is 8 trains each way on weekends and holidays and 14 on weekdays for the Toronto-Montreal segment.

The ABB proposal is designed to use the existing corridor railway line with appropriate up-grading to best take advantage of its steerable axle and tilt technologies. ABB proposed an average 12 trains per day in each direction between Montreal and Toronto, with adjustments depending on the period.

4.4 Observations

It must be accepted that the inter-related topics of alignment, design-speed and track configuration have not been considered in sufficient detail to establish the definitive operating strategies which would best satisfy anticipated market conditions.

Although the Task Force undertook a careful analysis of these matters, it is clear that a more thorough and exhaustive study must be made prior to an investment decision.

The related problems of introducing higher speed trains on tracks used by freight trains, and the catenary clearance issue, will have to be resolved; for even at 300 kph speeds, the dedicated track must sooner or later enter the principal cities on existing railway lines.

4.5 The Market Demand for High Speed Rail

The one element on which otherwise argumentative forecasters always agree is that estimating the ridership for a new passenger service is a difficult task. Not only must they have access to a complete picture of existing travel, they also need to have accurate surveys of peoples' predisposition to change behaviour in circumstances of varying fares, frequency and travel time as well as measures of their different attitudinal responses to the automobile, air, bus and train.

Further, different people respond in different ways. For example, the business traveller will have higher values for frequency and time, and lower values for cost, than someone on a non-business trip. Finally, it is important to factor in the economic and demographic trends which will drive travel demand into the future. It is an especially difficult undertaking, therefore, to estimate the likely ridership for the entirely new concept of a «superspeed» train, as a dramatic new competitor between the city-pairs of the Windsor-Quebec corridor.

It is, of course, made all the more risky by the near impossibility of forecasting the competitive air and bus industry responses or the extent of additionally «induced» travel due only to the introduction of a high speed rail service.

Experience elsewhere can only be a guide, as the character of each corridor can vary as much as its market conditions, and the attitudes of its residents. However, the consistent success of high speed trains in attracting ridership is worth mentioning. For example, the Shinkansen Tokaido carries about 100 million passengers per year between Tokyo and Osaka, securing 85% of the public transportation market for that corridor. Similarly, the TGV Sud-Est in France succeeded in attracting 17.3 million users in 1988, a major increase from the 13.3 million users of 1984.

4.5.1 The Database and Demand Forecast Model

The Task Force was conscious that the time available for its work was insufficient to undertake new surveys of passenger preference and city-pair volumes.

For this reason, the Task Force relied upon the extensive database developed by VIA Rail in the course of its «Review of Passenger Rail Transportation in Canada,» published in 1989. This database is the most comprehensive and recent information available and describes travel in year 1987. That VIA Rail made this extensive database available is much appreciated by the Task Force.

Nevertheless, a thorough examination was made of the information as it was known that it contained some statistical weaknesses and certain survey biases, particularly with respect to automobile travel. Even though a considerable effort was made to control or correct inaccuracies, there remain some lingering concerns, which can only be resolved by new and more intensive surveys of travel in the Corridor.

An integrated, two-stage travel demand model was used to forecast the total size of the travel market and to forecast each mode's market share. These forecasts were required for each of the three

speed options, for each city-pair and for each year from 2000 to 2020, and were segregated in business and non-business travel. The task required a number of iterations in order to be consistent with the intended service frequency, travel times and fares.

Table 4.4 shows the change in modal market shares which are forecast for the 200, 300 and 400 kph options by the year 2010, as a result of the introduction of high speed rail, and its year-over-year growth, in comparison with the circumstance in 1987.

While 200 kph service will capture an increase in the rail market share, a substantial overall increase in rail ridership requires service at 300 kph, while 400 kph service would achieve even more impressive market results. Clearly, speeds of 300 kph, or more, are likely to create trip times which will win a worthwhile market share for high speed rail.

TABLE 4.4 - TOTAL MODAL SHARE COMPARISON BY OPTION

	BASE YEAR (1987)	200 KPH (2010)	300 KPH (2010)	400 KPH (2010)
Rail				
o Million	3.38	5.00	7.79	11.47
o Percentage	(3.6%)	(4.2%)	(6.4%)	(9.3%)
Air				
o Million	2.67	2.59	2.34	2.21
o Percentage	(2.8%)	(2.2%)	(1.9%)	(1.8%)
Bus				
o Million	3.51	5.09	4.99	4.89
o Percentage	(3.7%)	(4.3%)	(4.1%)	(4.0%)
Auto				
o Million	85.26	107.02	106.00	104.62
o Percentage	(89.9%)	(89.4%)	(87.5%)	(84.9%)
Total Trips (Millions)	94.62	119.70	121.09	123.20

Examples of the actual ridership forecasts for the principal Corridor segments are shown in Table 4.5.

TABLE 4.5 - RIDERSHIP FORECAST IN YEAR 2010 BY OPTION AND BY SEGMENT

(In Millions)

	200 KPH	300 KPH	400 KPH
Quebec-Montreal	0.93	1.62	2.78
Montreal-Ottawa-Toronto	2.10	3.82	4.70
Toronto-Windsor	1.29	1.72	2.45
«Inter-segment» travel(1)	0.68	0.62	1.54
Total(2)	5.0	7.79	11.47

Notes: (1) Toronto-Trois-Rivières, for example
(2) Rounded totals

The numbers were developed using models which incorporated the independent variables of total travel costs (including access costs), access time, running time, service frequency as well as modal constants.

The model calculations were generally applied using a «pivot point» approach which used present rail ridership as a basis for adjusting the forecast of the impact of a «superspeed» train system. This was considered by some as too conservative and cautious a methodology. In the same vein, the elasticities and modal constants used to forecast consumer response to high speed rail were considered inadequate to represent this entirely new mode of transportation.

To illustrate this observation, the Task Force requested its consultant to run the model using the same constant as air travel for the 300 kph high speed rail ridership forecast. This was based on the fact that door-to-door travel times for that option compare favourably with air travel times. This exercise produced a forecast of 10.2 million users for the 300 kph option in year 2010, in comparison with the 7.79 million users of the original forecast.

Certain city-pair market shares are broken out as high speed rail forecast percentages, as shown in Table 4.6.

TABLE 4.6 - HIGH SPEED RAIL MARKET SHARE FORECAST IN YEAR 2010 BY OPTION AND BY MAJOR CITY-PAIR

Percentages for Business (B.) and Non-Business (Non-B.) Travel

	200 KPH		300 KPH		400 KPH	
	B.	NON-B.	B.	NON-B.	B.	NON-B.
	(%)	(%)	(%)	(%)	(%)	(%)
Quebec-Montreal	8.1	4.7	15.2	6.7	27.2	19.4
Montreal-Ottawa	11.6	3.6	22.5	6.1	33.6	13.5
Ottawa-Toronto	21.0	10.4	41.3	18.7	52.4	33.0
Montreal-Toronto	26.1	29.6	36.3	36.2	43.7	43.2
Toronto-London	6.8	1.6	9.7	2.1	14.4	3.1
Toronto-Windsor	31.2	15.0	43.7	18.2	58.2	31.5

These results indicate the extent of market penetration but indicate a surprising shortfall in challenging the automobile over the shorter city links.

For this reason and because of the other shortcomings previously described, the Task Force has recommended that a more thorough market demand study is necessary and should include an entirely new, four season, purpose designed survey of the entire Windsor-Quebec corridor.

4.5.2 Other Demand Forecasts

There have been other forecasts of high speed rail ridership in the Corridor, by VIA Rail in its «Review '89», and by Bombardier as part of its TGV proposal.

They are shown in comparison with the forecasts prepared for the Task Force, in Table 4.7. It is not surprising that the forecasts obtained by VIA Rail and by the Task Force are of the same order as they are both drawn from the same basic data, using similar models extrapolating from the 1987 market situation.

The Bombardier results were obtained from an analogous study of existing high speed trains (in France and Japan), which calculates the diversion of passengers from each mode to the high speed train, link by link. The resulting forecasts imply much more significant high speed rail achievement in winning automobile travellers.

It is interesting to note the results produced by the application of the «price of time» model to VIA's figures in a Sofrérail analysis of the VIA 1989 report. The «price of time» model, developed for high speed trains by Sofrérail, is based on the assumption that a traveller will choose between two modes on the bases of his own value of time, and of the cost and travel time for each mode. A generalized cost is derived from these data for each mode within each link, and the lowest value of this measure for the traveller will determine his choice of mode. That model provided preliminary

ridership results which are very close to those provided by Bombardier.

TABLE 4.7 - COMPARISON OF DEMAND FORECASTS FOR THE YEAR 2010

(Thousand of one-way trips)

	FORECASTS		
	TASK FORCE CONSULTANT	VIA 1989 REVIEW	BOMBARDIER
200 kph option			
Quebec-Montreal	548		
Montreal-Ottawa	391		
Montreal-Toronto	878	970	
Toronto-Ottawa	498		
Toronto-London	596		
Toronto-Windsor	528	490	
300 kph option			
Quebec-Montreal	983	870	2,687
Montreal-Ottawa	712	670	1,920
Montreal-Toronto	1,197	1,367	2,132
Toronto-Ottawa	985	1,129	1,389
Toronto-London	801		
Toronto-Windsor	700	590	

4.6 Fares

Ridership sensitivity to fare levels was explored during the Task Force work as a means to establish optimum fares for both the business and non-business groups, for each speed option.

The results, illustrated in Table 4.8, indicated relatively higher prices for shorter trips, in some cases doubling current VIA Rail fares, but much smaller increases for longer trips.

These levels were increased by 10% for revenue analysis purposes as recognition that yield management techniques could generate improved returns.

Nevertheless, for certain Corridor segments, where fare level ceilings might have been imposed by intense airline competition, there are suspicions that high speed rail could support higher fares and, thereby, higher revenues.

For this reason the financial analysis does examine the sensitivity of an investment in high speed rail to increases in both ridership and in fares.

TABLE 4.8 - HIGH SPEED RAIL FARES (ONE-WAY) - FOR BUSINESS TRIPS

(1987 Price levels)(1)

SUPERZONE PAIR	VIA FARES(2) 1987	HIGH SPEED RAIL OPTIMAL FARES 200 KPH	300 KPH	400 KPH
Windsor-Toronto	$ 37	$ 53	$ 56	$ 61
London-Toronto	$ 20	$ 43	$ 45	$ 47
Toronto-Ottawa	$ 43	$ 57	$ 63	$ 67
Toronto-Montreal	$ 49	$ 63	$ 68	$ 75
Ottawa-Montreal	$ 19	$ 43	$ 45	$ 47
Montreal-Quebec	$ 27	$ 48	$ 52	$ 54

Notes: (1) Fares are expressed in 1987 dollars. Future fares for non-business trips should be established at around 80% of the business fares.
(2) Average fares.

The difference between these rail fares and the corresponding air fares is greater than experience elsewhere would suggest.

4.7 The Costs

Railways are capital intensive investments. They require a road-bed of gentle curvature and even grades, dedicated to their purpose. Every metre of the way must be maintained to a consistent standard, of greater precision as speeds increase. At higher speeds, there must be separation, not just of ditches and rivers, but of every road and farm crossing. For passenger purposes, the equipment and control systems must be utterly safe and, therefore, sturdy and sophisticated. All of these requirements are expensive and must be entirely put in place, before they can begin to generate revenue. By comparison, the consequent operating and maintenance costs are of much reduced scale, and are more or less proportional to speeds and service frequency.

4.7.1 Capital Cost Estimates

The cost calculations for the 200, 300 and 400 kph options were developed by consultants to the Task Force and were based on recent relevant experience of railway construction and operating costs. The up-front, capital costs for the wheel-on-rail systems were produced by the application of unit costs to the specified alignments and the number of structures and kilometres of track. The 400 kph guideway costs were developed after discussion with those knowledgeable in the civil engineering and Maglev technology fields. However, the lack of any but prototypical Maglev systems must make these costs somewhat preliminary, particularly as the alignment was not located in the Corridor in more than generalized terms.

During the course of the study, different levels of investment were tested to generate trip times which took cost-effective advantage

of the respective technologies. The costs set out in Table 4.9 are consistent with the relative train performance displayed earlier in the report.

TABLE 4.9 - DETAILED CAPITAL COSTS BY INVESTMENT OPTION

(1990 $ Thousands)

COST ITEM	200 KPH	300 KPH	400 KPH
Land	74,250	156,200	84,150
Subgrade	35,754	823,705	
Track replacement	199,364		
New track and structures	378,061	1,285,900	
Guideway			4,971,120
Guideway equipment			2,103,750
Signals & communications	363,759	514,910	
Electrification		611,550	
Switches			48,510
Fencing	83,050	83,050	32,230
Power supply			1,009,800
Bridges & structures	298,245	1,020,460	
Crossings	380,380	799,700	
Stations	28,600	88,000	33,000
Maintenance equipment	8,800	58,300	40,700
Rolling stock (vehicles)	421,200	738,000	1,663,200
Engineering Design & administration	340,719	927,116	1,497,969
Total	2,612,182	7,107,891	11,484,429

The capital costs for the investment strategies are driven more by the need for superior track geometry, dedicated track and bridges than by the costs of electrification and additional train sets. At 400 kph, the guideway and guideway equipment are the key cost elements.

Each of the cost estimates includes a 15% overhead figure to cover the essential costs of engineering design and contract management and administration. The 15% allowance is a conservative figure which was considered realistic as much of the project will be repetitive in design and in construction. The capital costs are in line with estimates prepared by others. (See section 4.7.3).

Table 4.10, below, shows the capital costs for each of the Corridor segments:

TABLE 4.10 - TOTAL CAPITAL INVESTMENT REQUIREMENTS (INCLUDING ROLLING STOCK) BY OPTION AND BY SEGMENT

(1990 $ Millions)

	200 KPH	**300 KPH**	**400 KPH**
Quebec-Montreal	638	1,717	2,576
Montreal-Ottawa-Toronto	1,284	3,517	5,705
Toronto-Windsor	690	1,874	3,203
Total Corridor	2,612	7,108	11,484

4.7.2 Operating and Maintenance Cost Estimates

The operating and maintenance costs, shown in Table 4.11, are directly related to the operating frequencies anticipated to accommodate the forecast ridership.

The operating and maintenance costs, presented for each Corridor segment, were based on actual operating experience elsewhere, analysis of other high speed rail studies and, in the case of Maglev, specialized research advice.

As there is a trend to labour efficiencies in the rail industry, it was assumed that by the time a high speed rail service is introduced, «streamlined» labour arrangements will be in place. These were incorporated in the financial analysis.

TABLE 4.11 - ANNUAL OPERATING AND MAINTENANCE COSTS

(1990 $ Millions)

	200 KPH	300 KPH	400 KPH
Quebec-Montreal	45	52	65
Montreal-Ottawa-Toronto	104	116	142
Toronto-Windsor	63	69	82
Total Corridor (Streamlined)	212	237	289

Under the current labour practice, operating and maintenance costs would be significantly higher; at $ 308 million for the 200 kph option, $ 381 million for the 300 kph option, and $ 400 million for the 400 kph option, representing respectively 45%, 61% and 38% higher costs than the costs of «streamlined» arrangements.

Generally, the operating costs are very much of the same order and the variations are linked more to the relative complexity of managing increasingly higher speed systems.

4.7.3 Cost Estimates of Other Corridor Proposals

The comparison of the Task Force total capital cost estimates with those of VIA, Bombardier and ABB, which are shown in Table 4.12, reveals that the estimates are generally consistent with those of VIA and the private sector proponents. It appears that the most significant differences between those studies are related to route selection, signals and communications, and mitigation of freight train interference. The cost differences result from the use of different route assumptions and operational concepts.

TABLE 4.12 - CAPITAL COST COMPARISON BY SEGMENT

(In $ Millions)

	VIA '89 (300 KPH)	BOMBARDIER (300 KPH)	ABB (250 KPH)	TASK FORCE (300 KPH)
Quebec-Montreal	968	1,499	---	1,717
Montreal-Ottawa-Toronto	2,725	3,800	1,787	3,517
Toronto-Windsor	1,733	---	---	1,874

As for the operating and maintenance cost estimates, Table 4.13 illustrates a fair measure of consistency between the other studies in comparison with the Task Force estimates. For example, VIA figures are 1% lower for the Toronto-Ottawa-Montreal segment, and

Bombardier figures for the Toronto-Quebec segment are 7% higher than the Task Force estimates for the 300 kph option.

TABLE 4.13 - OPERATING COST COMPARISON[1] BY SEGMENT

(In $ Millions)

	VIA '89 (300 KPH)	BOMBARDIER (300 KPH)	ABB (250 KPH)	TASK FORCE (300 KPH)
Quebec-Montreal	31	180[2]	175[3]	52
Montreal-Ottawa-Toronto	115			116
Toronto-Windsor	62			69

Notes: [1] Comparison is based on costs derived from «streamlined» labour arrangements.
[2] Quebec-Montreal-Ottawa/Hull-Toronto segment.
[3] Entire Corridor.

4.8 The Financial Analysis

The Task Force's work plan was designed to generate the probable costs and likely revenues for each of the investment options, in order that their respective financial performances could be compared.

4.8.1 Financial Results by Option

The comparison properly took into account, the capital and operating costs and the off-setting revenue streams which were respectively derived from the operating strategies and market demand studies for each option. In the view of the Task Force, the estimates of

operating costs and revenues are conservative. The principal financial results are set out in Table 4.14. In each case, operating revenues exceed operating costs. However, these results indicate insufficient financial returns for the private sector to invest in any of the options without government assistance.

TABLE 4.14 - COMPARISON OF FINANCIAL RESULTS BY OPTION

(1990 $ Millions)

	200 KPH	300 KPH	400 KPH
Investment	$ 2,612	$ 7,108	$ 11,484
Average revenues	$ 260	$ 439	$ 685
Average operating expenses	$ 213	$ 238	$ 289
Average operating cash flow	$ 47	$ 201	$ 396
Return on investment - IRR	- 1.6%	0.4%	1.2%

The Task Force consultants estimated the level of public assistance required to enable the private sector to earn an acceptable rate of return. The consultant used a discounted cash flow methodology and an inflation adjusted discount rate of 14% to estimate the requisite government grant.

The 400 kph option has a slightly better return than the 300 kph option due to its capacity to attract more passengers at higher fares. However, the Maglev technology remains unproven and there will be difficulties in securing the necessary new right-of-way, particularly in the urban areas. In view of the negative IRR of

the 200 kph option and its weaker long term prospects, the 300 kph option should be regarded as the most attractive investment.

A following section examines the impact of changes in discount rates, revenues and ridership forecasts on internal rates of return and the «government grant».

4.8.2 Financial Results by Segment

The analysis has also shown somewhat similar financial results for the three segments of the Corridor. For this evaluation, four «construction options» were assumed: Montreal-Toronto, Quebec-Toronto, Montreal-Windsor, as well as the entire Corridor.

Table 4.15 presents the financial results by construction option and, consequently, by Corridor segment.

TABLE 4.15 - COMPARISON OF FINANCIAL RESULTS BY CONSTRUCTION OPTION

	RETURN ON INVESTMENT (ROI)		
CONSTRUCTION OPTION	200 KPH	300 KPH	400 KPH
Montreal-Toronto	- 2.2%	0.6%	0.8%
Quebec-Toronto	- 2.3%	0.5%	1.5%
Windsor-Montreal	- 1.4%	0.4%	0.6%
Quebec-Windsor	- 1.6%	0.4%	1.2%

Windsor-Toronto at 200 kph and Quebec-Montreal at 400 kph are two cases showing slightly better results. Table 4.15 shows that, using the 400 kph option as an example, the return on investment of 0.8% obtained for the Montreal-Toronto core segment is improved to 1.5%

for the overall Quebec-Toronto segment, indicating that the Montreal-Quebec segment produces a return on investment greater than 1.5%.

4.8.3 Commercial Discount Rates

In order to examine alternative financing arrangements, calculations were made using discount rates of 6%, 11% and 14%. The underlying premises are shown in Table 4.16.

TABLE 4.16 - ESTIMATED COMMERCIAL DISCOUNT RATES

Discount Rate Premises			
o Required return on equity (after tax)	15%	16.5%	16.5%
o Interest rate on debt financing	10%	12%	12%
o Corporate tax rate	0%	40%	40%
o Inflation	5%	5%	5%
o Capital structure (not incl. govt. grant)			
- Debt	70%	70%	50%
- Equity	30%	30%	50%
Estimated Commercial Discount Rates	**6%**[1]	**11%**	**14%**

Note: [1] This represents a scenario where the two senior levels of government provide a 20 year tax holiday for the private sector investment.

4.8.4 Analysis of Variations in Ridership and Fares

Additionally, a range of more favourable scenarios of increased ridership and fares were tested.

4.8.4.1 Ridership

The ridership levels used so far in the financial analysis are provided by the Market Demand Study. It is believed by some that the figures for start-up year 2000 are underestimated, for the reasons mentioned in section 4.5. Another element of concern is the annual growth rate of 0.6% used in the Market Demand Study for projecting ridership up to year 2020.

To extend the range of possibilities, a number of other ridership assumptions were tested.

The ridership levels estimated for year 2000 in the Market Demand Study were maintained for the first year of operation. However, for the years following the introduction of high speed rail service, six assumptions concerning the annual growth rate in ridership were employed: first, the Base Case annual growth rate of 0.6% used in the Market Demand Study, and then five other assumptions for ridership levels in the year 2010, compared to the year 2010 Base Case, and forecasting increases of 10% (1.7%), 20% (2.8%), 30% (3.9%), 40% (4.9%) and 50% (6%). The figures in brackets represent the total annual growth rates required from year 2000 to produce the year 2010 ridership levels of the five assumptions.

In comparison, the TGV Sud-Est secured an average annual growth rate of 31% from 1982 to 1988, with the largest increases in the first two years of operation. The Shinkansen produced a somewhat similar performance on the Tokyo-Osaka corridor.

4.8.4.2 Fares

The operating revenue estimates are based on forecasted ridership levels and fares. A number of assumptions for fare levels were employed: first, the «optimum» level estimated by the econometric

model of the Market Demand Study as generating maximum revenues and defined as Base Case fares; then fares 10%, 20%, 30%, 40% and 50% higher than the optimum level.

While the Market Demand Study has indicated ridership sensitivity to fares, it is implicitly assumed for this evaluation that the ridership levels can be achieved even if fares are increased.

Table 4.17 shows the fare levels resulting from the six assumptions, using the Montreal-Toronto segment as an example, and compares them with the regular economy airfares charged by the airlines in 1990. VIA Rail 1987 average fare on this same segment is provided as a reference.

TABLE 4.17 - HSR ONE-WAY FARES, MONTREAL-TORONTO SEGMENT (1987 level)

	HIGH SPEED RAIL FARES (1987 LEVEL)		AIR FARE REGULAR ECONOMY CLASS[(1)]		VIA RAIL AVERAGE FARE	
	BUSINESS	NON-BUSINESS	1987	1990	1987	1990
Optimum fare-Base Case	$ 68.00	$ 54.40				
(% of 1987 air fare)	(60.2%)	(48.1%)				
Base Case plus 10%	$ 74.80	$ 59.84				
(% of 1987 air fare)	(66.2%)	(53.0%)				
Base Case plus 20%	$ 81.60	$ 65.28				
(% of 1987 air fare)	(72.2%)	(57.8%)	$113.00	$ 120.80	$ 49.00	$ 62.00
Base Case plus 30%	$ 88.40	$ 70.72				
(% of 1987 air fare)	(78.2%)	(62.6%)				
Base Case plus 40%	$ 95.20	$ 76.16				
(% of 1987 air fare)	(84.2%)	(67.4%)				
Base Case plus 50%	$ 102.00	$ 81.60				
(% of 1987 air fare)	(90.3%)	(72.2%)				

Note: (1) Air fares are subject to frequent change. On any given day, there are many different fares. Fares in 1990 were unusually low due to exceptionally intense competition.

4.8.4.3 Sensitivity Analysis (Ridership and Fares) of Financial Results (300 kph Option)

The sensitivity analysis of the financial results for the 300 kph option is set out in Table 4.18. The effects of variations in discount rates, fares and ridership were analyzed in-depth. Each of the six fare assumptions was combined with the six ridership assumptions, for a total of 36 combinations for each of the three discount rates considered. To facilitate the presentation, equivalent assumptions were employed (Base Case +30% for example) for both fare and ridership levels.

The data provided include the number of one-way trips forecasted in year 2010, the internal rate of return on the respective investment, and the percentage of government grant required to produce the designated return on the private sector portion of the investment.

TABLE 4.18 - FINANCIAL RESULTS FOR 300 KPH OPTION - INCREASED RIDERSHIP AND FARES

PARAMETERS				RESULTS	
DISCOUNT RATES	FARES	RIDERSHIP LEVEL	TRIPS 2010 (1,000'S)	INTERNAL RATE OF RETURN	GOVERNMENT[1] GRANT
6%					
	Base Case[2]	Base Case[2]	7,786	0.4%	64%
	+10%	+10%	8,564	2.2%	48%
	+20%	+20%	9,343	3.8%	29%
	+30%	+30%	10,121	5.3%	10%
	+40%	+40%	10,900	6.6%	-9%[3]
	+50%	+50%	11,678	8.0%	-31%[3]
11%					
	Base Case	Base Case	7,786	0.4%	80%
	+10%	+10%	8,564	2.2%	72%
	+20%	+20%	9,343	3.8%	62%
	+30%	+30%	10,121	5.3%	51%
	+40%	+40%	10,900	6.6%	41%
	+50%	+50%	11,678	8.0%	29%
14%					
	Base Case	Base Case	7,786	0.4%	85%
	+10%	+10%	8,564	2.2%	79%
	+20%	+20%	9,343	3.8%	71%
	+30%	+30%	10,121	5.3%	63%
	+40%	+40%	10,900	6.6%	56%
	+50%	+50%	11,678	8.0%	47%

Notes: (1) Proportion of discounted capital costs to be provided by governments, in 1990, in order to enable the private sector to earn an acceptable rate of return.

(2) The «Base Case» fares (optimum level) and ridership level are obtained from the market demand study.

(3) Tax revenues would flow to government.

The use of discounted cash flow analysis requires long-range assumptions about the cost of capital and about inflation. It will be seen from Table 4.18 that different financial and market demand assumptions cause a wide variation in the extent of required government investment.

As a consequence, the Task Force acknowledged that the extent of required government funding could not be established until an entirely new and wholly reliable market demand forecast has been used to substantiate and specify more accurately the financial conclusions. The Task Force considered that it would be inappropriate at this time, therefore, to draw any firm conclusions regarding the economic returns to be generated by the project.

4.8.5 Possible Administrative Structures

What is clear, however, is that the potential investment partners in a high speed rail project would benefit if government played a participatory role. The Task Force gave preliminary consideration to different administrative structures, when they identified the following possible administrative alternatives:

- **Public utility** - when fixed plant would be provided by the government, and investment in rolling stock would be the responsibility of the private sector.

- **Modified public utility** - a variation on the above structure, where the government contribution would be limited to 30% of the fixed plant and to advancing funds for the balance of the fixed plant investment. This advance would be repaid by the operator through user fees.

- **Crown corporation** - a structure in which railway service would be entirely the responsibility of the public sector, with an

operator who would get a 20-year tax holiday, while incurring financing costs at government borrowing levels.

Finally, the Task Force considered that any further evaluation might more usefully be cast as a cost/benefit analysis which should take into account not just direct costs and revenues but the findings of the further completed economic and environmental studies as well as any other relevant information. While the Task Force examined the broader socioeconomic impacts, including the impacts on the environment, they were not sufficiently quantified for incorporation in a detailed cost/benefit analysis.

4.8.6 Other Financial Estimates

The financial analyses conducted by VIA Rail and Bombardier of their 300 kph proposals were aimed at determining the required sources of capital.

VIA Rail's results, using market costs of capital, suggested a 50% government contribution would be required.

Bombardier's analysis, which assumed similar conditions of finance, indicated the need for a 30% government grant.

The difference between the two is essentially due to differences in forecasts of ridership and attainable fare levels.

ABB's financial evaluation of its lower cost Montreal-Toronto proposal encouraged the company to say that the level of government subsidy would be minimal.

4.8.7 Observations

Notwithstanding the need for further investigation of the likely revenue streams for a high speed rail project, the Task Force also noted that financial performance might be improved by the following considerations:

- There may be some revenue potential associated with station commercialization and real estate development. Although these possibilities were not addressed in quantitative terms by the Task Force, members did meet with entrepreneurial groups who have successful experience in these fields (see Appendix «D»).

- The matter of discontinuance of conventional passenger rail service and the consequent massive savings for the federal government is both relevant and of major significance. Preliminary estimates indicate that such savings might be in the order of $ 150-170 million annually. In addition, the Federal government, would avoid the inevitable costs of replacing VIA Rail's corridor passenger equipment, which could constitute hundreds of millions of dollars more in savings over the time-span used for the financial analysis. The likely total savings to the federal government to the year 2020 is nearly $ 7 billion and has a 1990 net present value (NPV) of about $ 1.3 billion.

- A final consideration relates to local HSR service. To simplify its pre-feasibility investigation, the Task Force decided not to consider local services. The studies show, however, that approximately 90% of the required investment would be for fixed plant. Comparatively little additional investment would be needed to support at least some local HSR service. It is possible that an added local service with frequent stops could improve the overall results.

4.9 The Socioeconomic Impacts

The impact of transportation investment goes far beyond the fact of its installation or the availability of its services. Its very existence can change geographic relationships, investment decisions and demographic patterns.

The Task Force economic studies indicated that high speed rail would generate clear benefits to its riders, to the communities it served and to industry as a whole. The likely impacts on the transportation sector and on the general economy were estimated by the Task Force consultants.

As an attempt to describe the probable effects of the high speed rail alternatives, the Task Force organized two socioeconomic impact studies.

The first considered the impact of high speed rail on the transportation circumstances of the Corridor. It addressed not only the potential avoidance or deferral of public investment in airport and freeway improvements, but the consequent competitive situation among the other carrier companies. It also attempted to capture the aggregate value of the time savings which would accrue to its users; that is the «consumer surplus».

The second took a macro-economic view, reviewing the employment and income generating affects of the alternative investments on the economies of the two provinces and of Canada.

Both studies used the demand forecasts and capital estimates as the main basis for their research and are, therefore, consistent with but also limited by the results of the whole body of the Task Force work.

4.9.1 The Effect on the Other Modes

The market shares forecast for the air, bus and automobile modes were used to estimate the changed ridership, and the likely frequencies and fares of the competing carriers, after high speed rail service is introduced.

Among the public carriers, the airlines would experience a minor loss in market share, principally in the Montreal-Toronto and Ottawa-Toronto markets, where passenger traffic could decline if 300 kph train service is introduced. In the shorter city-pair routes, where airlines are less competitive, it is the bus mode which could lose passengers to rail.

However, non-business bus travellers, who are more price-sensitive, are expected to remain loyal. Overall, the bus industry was estimated to maintain its market share of Corridor travel as it was assumed for the purpose of the study that conventional train services would be discontinued.

That discontinuance would create a considerable saving to the federal government, as already described. The annual operating deficit of VIA Rail's current services in the Corridor is estimated at $ 150-170 million. Avoidance of equipment replacement costs would save many millions more. The likely total savings to the federal government is estimated at nearly $ 7 billion over the time-span used for the project evaluation. The employment losses, however, would be offset by staffing the higher frequency high speed rail operation.

While considerable in absolute terms, the impact on automobile travel is anticipated to be rather modest in relative terms for the Corridor as a whole. Reductions are not expected to be more than 5% at best on rural sections of the Corridor freeways. The effect at the city

approaches, where congestion is an issue, would probably not be noticeable.

The reduction in Corridor flights would similarly have only a limited effect on the overall level of activity at the Montreal, Toronto and Ottawa airports, possibly reducing aircraft movement by around 1% at Montreal and Toronto and by around 3% at Ottawa; even though the services between them could be halved.

The evaluation of impacts on the freeway and airport infrastructures revealed that the introduction of high speed rail would not have noticeable impacts on the level of expenses for the operation and maintenance of these infrastructures or on the level of investment required of their rehabilitation or capacity expansion.

What may be argued, however, is that it will change travellers' perceptions of the distance between the Corridor cities and the convenience of journeys between them. The Task Force requested its consultant to derive an aggregate value of the time savings which would accrue to high speed rail users.

The result is the «consumer surplus» which provides a measure of the anticipated benefits for the riders of the HSR. The Net Present Value (NPV) of the consumer surplus, during the period 2000-2020 is estimated (in 1990 dollars) at $ 489 million for the 200 kph option and $ 2.7 billion for the 300 kph option.

4.9.2 Construction Impacts

An investment in high speed rail involves expenditures on a grand scale. The consequent returns in employment and in economic activity are of equal scope, and could be contemplated, in an equating of costs and benefits, as justification for the financial support of the provincial and federal governments.

Statistics Canada's Input/Output model was used to measure the relative inputs of labour and materials and to forecast the consequent impact on suppliers, on direct and indirect employment and on government revenues.

The model could also have been used, with a lesser degree of reliability, to calculate the «induced effects» of the project, that is, the manpower and supplies employed to produce the consumer goods and services sold to workers who are employed, directly or indirectly, to the project. For the sake of ensuring conservatism, the induced effects are not included in the estimated impacts.

Based on its experience with these models, the consultant expects the induced effects could increase the overall impacts by 20 to 50%.

Since the true economic impact would depend upon the state of the economy at the time of the construction work, it was assumed that the investment would not «crowd out» other alternative investments and would not be committed at a time when it could cause «inflation» in the construction or supply industries. Should there be significant slack in the economy, for example, during a major recession, the investment would have a very healthy effect.

The economic impacts were calculated for each of the two provinces in terms of employment and income generation during construction. The totals are shown in Table 4.19.

TABLE 4.19 - EMPLOYMENT AND INCOME GENERATED DURING CONSTRUCTION PHASE BY OPTION

	200 KPH	300 KPH
Employment (in person-years)		
Direct	33,600	96,000
Direct and indirect	44,900	127,000
Income generation (1990 $ Millions)		
Net indirect tax	$ 81	$ 229
Wages, salaries etc.	$ 1,368	$ 3,754
Other income	$ 581	$ 1,616
Total income generation	$ 2,030	$ 5,599

The construction phase of the HSR project would generate an estimated 45,000 person-years of employment for the 200 kph option and 127,000 person-years for the 300 kph option.

The most significant employment benefits are in the industrial construction sector which would enjoy a significant boost in employment in the two provinces.

Government revenues which would accrue as tax receipts to the federal and provincial governments include both personal and corporate taxes as well as retail sales taxes, health premiums and other employment-related taxes. These are displayed in Table 4.20.

TABLE 4.20 - NET TAX RECEIPTS GENERATED BY THE CONSTRUCTION

(1990 $ Millions)

	200 KPH	300 KPH
Federal	402	1,114
Quebec	102	266
Ontario	156	433
Other provinces	30	93
Total	690	1,906

It must be noted that the new 1991 GST levy was not included in the calculations. It will, no doubt, increase the total of government tax receipts. However, it will also have some effect on all the transportation forecasts associated with the Task Force work, presumably reducing some and increasing others. Pending new, and more detailed, analysis it is assumed the overall effect will be economically neutral.

The net impacts from the operation and maintenance of the system are presented in Table 4.21 for both employment and income generation. The job losses and reduced revenues experienced by other modes of transportation as a result of the introduction of high speed rail have been deducted from the estimated gross operating impacts.

TABLE 4.21 - NET ANNUAL EMPLOYMENT AND INCOME GENERATED BY HIGH SPEED RAIL OPERATIONS AND MAINTENANCE

	200 KPH	300 KPH
Employment (in person-years)		
Direct and indirect	1,151	734
Income generation (1990 $ Millions)		
Total	$ 10.8	($ 28.5)

The annual total net tax receipts induced by high speed rail operation and maintenance is estimated to be marginally negative at $ 13 million per year for the 200 kph option, and at $ 44 million per year for the 300 kph option.

Overall, the investment creates very considerable increases in employment, income generation and tax revenues and is in itself a reason for government interest in the project.

4.9.3 Industry, Community and Tourism Impacts

4.9.3.1 Industry Impacts

A compelling argument for early investment in a high speed rail system for the Windsor-Quebec corridor is that it would be the first in North America, and would serve as a «demonstration» of Canada's technological capability.

The value of this advantage is potentially very large as it could affect the investment decisions in the many high speed rail corridors which are already under study in the United States. Some sources believe that the value of this market could be in the order of

$ 70 U.S. billion in the next ten to fifteen year period. It is estimated that the demand for Canadian suppliers could range from 8 to 30% of this dollar value. Should Canadian bidders secure 25% of this potential, then the «demonstration effect» would be worth around $ 1.5 to $ 5 U.S. billion.

4.9.3.2 Community Impacts

In order to assess the relative impact on the Corridor communities, discussions were held with the Economic Development Officers and with numerous businesses, regarding the factors influencing location investment decisions. Such investment decisions are influenced by, among other things, differential location costs and by transportation convenience. Thus, at the community level, a high speed train could cause an increase in the shift of offices from the major cities to intermediate centres. Similarly, it could induce a shift from one community to another if it is served by high speed rail and the other is not.

Also, the existence of a high speed train could ease the decentralization of government departments and public institutions.

4.9.3.3 Tourism Impacts

The impact of a high speed train on tourism was estimated for the Task Force on the basis of advice from tourism officials and from tour operators. Forecasts of up to one million additional riders were produced together with estimates for the year 2020 of up to $ 66 million in annual incremental tourist expenditures for the 300 kph option.

The additional demand for tourism services is expected to generate tourist-related construction spending. The overall benefits estimated for the tourism industry are shown in Table 4.22.

TABLE 4.22 - ESTIMATED ANNUAL ECONOMIC IMPACTS ON THE TOURISM INDUSTRY IN THE YEAR 2020

	200 KPH	300 KPH
From incremental tourist spending		
Employment (in person-years)	735	2,253
Income (1990 $ Millions)	$ 19.0	$ 58.0
Net tax receipts (1990 $ Millions)	$ 6.5	$ 20.6
From tourist-related construction spending		
Employment (in person-years)	164	505
Income (1990 $ Millions)	$ 18.0	$ 56.0
Net tax receipts (1990 $ Millions)	$ 7.3	$ 22.6

4.9.4 Government Revenues

The annual cumulative impacts on the government net tax receipts resulting from the operation of the high speed rail system have been estimated and are presented in Table 4.23. These estimated impacts include the expenditure reductions that might be achieved by governments.

TABLE 4.23 - ANNUAL CUMULATIVE IMPACT ON TAX RECEIPTS[1]

(Including Expenditure Reductions)
(1990 $ Millions)

200 KPH	1997-1999	2000-2009	2010-2020	TOTAL PERIOD (1997-2020)
Federal	134	157[2]	156[2]	3,684
Quebec	34	3	3	165
Ontario	52	(6)[3]	(7)[3]	21
Other Provinces	10	1	1	43
Total[4] (all governments)	230	154	153	3,912

300 KPH	1995-1999	2000-2009	2010-2020	TOTAL PERIOD (1995-2020)
Federal	223	150[2]	148[2]	4,243
Quebec	53	3	2	317
Ontario	87	(11)[3]	(12)[3]	194
Other Provinces	19	(3)[3]	(3)[3]	38
Total[4] (all governments)	381	139	136	4,793

Notes: (1) These figures do not incorporate GST. This tax may have an impact on the ridership and, therefore, on the revenues of high speed rail.

(2) Includes an annual saving of $ 160 million resulting from the elimination of the conventional rail subsidy.

(3) This negative figure partially results from the loss of fuel taxes.

(4) Rounded totals.

4.10 The Environmental Impacts

Transportation plays a vital role in the economies of industrialized nations and in the daily lives of their people. The nature and extent of transportation's impact on the environment depend as much on the means of transportation as on the level of activity.

In the context of the competing automobile, air and bus modes, railways have long enjoyed a reputation for energy efficiency. Now that global warming and exhaust emissions are public concerns, energy efficiency has become synonymous with environmental protection.

The modal shift which would occur upon introduction of a high speed train in the Windsor-Quebec corridor could be environmentally advantageous unless the impact of its construction offsets the gain. That impact has not been precisely calculated by the Task Force.

What has been done is to describe the comparative impact of those investment strategies and to describe their likely direct and indirect effects on the environment.

The scale of capital investment required to introduce what will be a new mode of transportation, with new environmental characteristics, will unquestionably warrant a full governmental assessment of the environmental impact. The environmental review procedures required by the provinces of Quebec and Ontario and by the federal government will, no doubt, be lengthy and demanding.

4.10.1 Direct Impacts

The direct effects fall into three main categories; disruption of the local environment, the visual impact on the landscape, and noise and vibration. Their severity will vary in zones of different land use, in farmland, urban, suburban, recreational or rural areas.

Disruption of the local environment refers to the physical rupture caused by construction of a new line which will create a social barrier if certain roads or rural access routes are diverted or closed. In the same way, roads in urban areas will undergo modification as new bridges or overpasses are built.

The visual impact on the landscape refers to the line's intrusion into the visual environment of local residents. The presence of the infrastructure will constitute the major impact on the landscape, especially in developed areas.

Noise and vibration caused by passing trains may be a regular disturbance for residents close to the route. The sources include wheel, motor and aerodynamic noise. Their impact depends on the speed and duration of the train's passing, the time of day and the ambient noise level in the area.

4.10.1.1 Concerns in Agricultural Areas

In the event a new alignment is favoured, the main issues likely to be raised in agricultural areas will be the loss of arable land, the severance of farms and fears for the electromagnetic induction effects of high voltage lines or Maglev guideway. Also disruption caused by the construction and maintenance of the right-of-way could raise agricultural concern.

Loss of arable land - The introduction of a high speed train travelling at a maximum speed of 300 kph would cause greater losses of arable land than would the elevated guideway 400 kph option. As the 300 kph option would require a high quality alignment, the builder would have to acquire numerous parcels of land even if sections of available right-of-way were used as a basis for a new route. These purchases would be made primarily along the St. Lawrence Valley and through developed Quebec and Ontario.

Noise, vibration and the visual environment - The visual intrusion of high speed train and the associated noise and vibration, while important, will be less significant in rural than in urban areas. However, in recreational areas or places of natural beauty, some special treatment would have to be considered.

4.10.1.2 Concerns in Urban Areas, the Urban Periphery and Recreational Areas

The introduction of a high speed train could have a direct impact on the quality of life of nearby residents, in terms of noise, visual impact and local disruption. Special attention will have to be paid to regional and municipal planning priorities in order not only to comply with land use plans and related regulations, but to integrate the high speed system with the future plans for the communities.

In the event sections of entirely new right-of-way are required, the impact would be that much more significant.

Noise, vibration and the visual environment - In the case of the 400 kph option, significantly lower noise levels are expected due to the absence of wheel-on-rail contact. As noise levels depend on speed, however, it will generate higher aerodynamic noise, which might be attenuated by the height of the support structures.

In comparison with more conventional diesel or turbine rail systems with maximum speeds of 200 kph or so, the 300 kph option should have a number of advantages in terms of motor noise and vibration.

The presence of the new infrastructure required for the 300 kph or 400 kph options would be the main source of visual impact, as the 200 kph option involves no major new building and the existing track has already been absorbed into the landscape. Apart from new track, the added facility for the 300 kph option essentially consists of the overhead electric power supply catenary system. In the case of

the 400 kph option, the track is an elevated guideway running at least 5 metres above the ground along the entire route. While it will, therefore, be much less of a barrier, it will be visible from greater distances.

Impacts depending on type of area - A high speed rail system will have a greater direct effect in suburban than in the major urban areas, as there would be reduced speeds near city centres, and tracks which use existing corridors generally pass through industrial zones. For these reasons, the visual impact would be mitigated to a significant degree. The 400 kph option could, however, be an exception in this respect as it requires an elevated platform, even in urban areas.

The same is not true of the urban periphery, which generally consists of residential suburbs. People there are more likely to be disturbed by the presence of high speed rail as they tend to be sensitive to changes in their living environment.

Resort and tourist areas, near urban centres (e.g. the residential and recreational zones around Lake St. Clair near Windsor) and heritage areas in rural districts (e.g. the rural countryside in the Kingston area) are environments in which the introduction of high speed trains, particularly the 400 kph option, poses the most delicate problems. Special effort will probably be required to conceal the structure and perhaps the trains themselves.

4.10.1.3 Concerns in Natural Environments

A high speed train investment, particularly on new alignment, would have a direct impact on flora, fauna and the local hydrology.

Flora and fauna - With respect to flora, the impact of a high speed train should be fairly minor, regardless of the option in question,

due to the geographic location of the rail corridor in the St. Lawrence and Great Lakes lowlands. Nevertheless, it would be appropriate, however, to identify any affected woodlands along the route chosen and to assess their value.

Fauna present a special problem in the case of the 300 kph option, as the rights-of-way would be entirely fenced in. It would be important to identify animal species living near the rights-of-way and to determine their migratory patterns. It may be necessary to provide culverts or overpasses for migrating animals at appropriate locations. Special attention will have to be paid to known wildlife habitats, such as the wintering areas of white-tailed deer and wetlands used by birds.

Hydrology - The elements of the hydrological system which could be affected are the river systems and drainage conditions. During the construction phase in particular, the rerouting of roads might, for example, affect the channels of rivers and streams, waterside environments, water quality and sedimentation. The impact on drainage conditions would affect run-off coefficients and water flow.

The 200 and 300 kph options are expected to have a greater impact on drainage conditions than the 400 kph option, given the features of these technologies.

4.10.1.4 Mitigation Measures

Mitigation measures can be applied to all three types of environmental impact: disruption of the local environment, the visual impact on the landscape, and noise and vibration.

Disruption of the local environment - Means to diminish the adverse effects of land severance in farming areas include the regrouping of lands, the re-establishment of agricultural drainage networks and

the maintenance of access to farms. In the more urban and city areas, landscaping or the creation of community recreation areas could compensate for the disruptive effects of new alignments.

Landscape - The mitigating measure most commonly employed to soften visual impact and the effects on the landscape is to depress the track by means of cuttings, tunnels or partly-buried landscaped coverings at elevated crossings. Landscaping by planting trees is another possibility wherever this would appreciably enhance the integration of the installation into its surroundings.

Noise and vibration - The 300 kph option appears to be best suited to the effective use of noise and vibration control measures. The most common protective measure in populated areas is lowering the line into a cutting. When it is not possible to depress the track, earth barriers or sound barrier walls can be very effective mitigating devices.

Placing vibration dampening devices under the track in urban and peripheral areas can significantly reduce the effects of vibration.

4.10.1.5 Disruption During Construction

The construction of the high speed train infrastructure would take from 3 to 5 years, depending on the option in question. The environmental effects would be noise, vibration and dust from the movement of heavy machinery and heavy traffic in parts of the Corridor. In addition, the consequent burning of fossil fuels and related air pollution should not be overlooked.

These effects would be more significant in the case of the 300 and 400 kph options than for the 200 kph option.

4.10.2 **Indirect Impacts**

The indirect effects on the environment of introducing a high speed train between Quebec City and Windsor involve the potential for more rational land use, decreased energy consumption, less pollution and greater safety. These indirect impacts on the environment will all be beneficial insofar as the high speed train will attract a large clientele which previously relied on automobile and air transportation.

4.10.2.1 More Rational Land Use

The case can be made that rail transportation takes up less space than other modes of transportation linking the same city-pairs. A rail right-of-way is usually narrower than a highway and uses less raw land than a major airport.

4.10.2.2 Lower Energy Consumption

Transportation activity represents about 30% of the total energy consumption of industrialized countries, and depends almost entirely on oil. From 1970 to 1987 there was a 50% increase in this consumption, and it does not appear this trend will change unless concerns for the environment prompt new policy directions.

The energy efficiency of the various modes of transportation can be measured in different ways: in grams of oil-equivalent energy per passenger-kilometre or in kw/hour per passenger-kilometre.

Given certain load factor assumptions, both these measurements produce approximately the same results: the energy efficiency of the high speed train is from 2 to 3 times that of the automobile, while travel time is 3 to 6 times faster. Compared to the airplane, the high speed train is 4 to 6 times more energy efficient.

4.10.2.3 Reduced Pollution

From the numerous studies of ways and means to improve the quality of the environment, it may be concluded that air pollution attributable to the various modes of transportation will become a central concern of any environmental policy. One of the ways to improve the quality of the environment is to encourage a change in modal shares to achieve greater use of public transportation. High speed trains in particular represent an effective means to achieve this improvement.

Since 1970, air pollution regulations have grown increasingly strict in Canada, resulting in a 90% decrease in carbon monoxide and hydrocarbon emissions and a 75% decrease in nitrogen oxide emissions. However, these gains were offset by the growing number of automobiles, trucks and buses on the road each year.

In Canada, atmospheric emissions attributable to the various modes of transportation account for 43% of total hydrocarbon (HC) emissions, 57% of total carbon monoxide (CO) emissions, 27% of carbon dioxide (CO_2) emissions and 51% of total nitrogen oxide emissions (NO_x). These atmospheric pollutants have an effect on the environment and an impact on the earth's atmosphere, as well as posing a health risk.

In a preliminary report commissioned by the Council of Ministers of the Environment and tabled in March 1990, the Windsor-Quebec corridor was identified as a critical zone in which acceptable levels of ozone concentration are most frequently exceeded. Although air flows from the United States contribute to the concentration of atmospheric pollutants, it has been clearly established that at least 42% of nitrogen oxide emissions come from road vehicles and that 31% of volatile organic compounds (V.O.C.s) are attributable to light vehicles and gas stations. The Ontario Ministry of Transportation

has estimated that, in the provinces of Quebec and Ontario, transportation is responsible for 63% of nitrogen oxide emissions and 40% of volatile organic compound emissions.

An electrically powered high speed train is a clean vehicle, which uses a renewable resource, if hydroelectric power is used. A significant increase in the use of the high speed train between Windsor and Quebec City would result in substantial reductions in polluting emissions of nitrogen oxide and volatile organic compounds produced by automobiles and planes. The current emphasis on the dangers of the greenhouse effect produced by carbon dioxide and on the problem of acid rain resulting from nitrogen oxide emissions underscores the advantage of the electrified railway.

4.10.2.4 Safety

Approximately 6 million vehicles are registered in Ontario and 4 million in Quebec: of these, 75% are automobiles. In 1984, TRIP-Canada estimated that, in the year 2000, the density of automobile traffic will have increased by 75% and that of truck traffic by 140%.

Experience with high speed trains in Japan and France has shown that these trains are very safe: not a single fatal accident has been attributed to their operation. This can be explained by a number of factors, notably the use of state-of-the-art technologies for infrastructures, rolling stock, and signalling equipment, as well as the use of fenced rights-of-way.

Their safety record contrasts with that of road vehicles. Quebec accident statistics for 1988 indicate 50,922 accident victims, including 1,030 fatalities; 6,473 suffered serious injuries and 43,419 sustained minor injuries. Furthermore, there were some 152,000 accidents which resulted in material damage for which repair

costs are estimated at roughly $ 2 billion, according to data supplied by Quebec's Road and Highway Construction Association.

A comparison of 1987 accident statistics for Quebec and Ontario reveals that the fatality rate per 10,000 registered vehicles was 3.3 in Quebec and 2.2 in Ontario, while the injury rate was 214.9 in Ontario and 179.3 in Quebec.

A shift from automobile travel to a high speed train can be expected to result in fewer accidents. If the costs of damage to automobiles were reduced by 5%, annual savings of $ 100 million would result in Quebec alone. With respect to accident victims, the Canadian government estimates that each fatality represents a cost to the economy of $ 690,000, that is approximately $ 1.4 billion per year for Quebec and Ontario. Were only 5% of these accidents to be averted, there would be annual savings to the economy of $ 70 million.

4.10.3 Observation

The net balance of the environmental impact of an investment in high speed rail must involve an assessment of the direct affects of its construction and the indirect affects of its operation.

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5. ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURES

5.1. Introduction

High speed passenger rail services, of the type contemplated for the Windsor-Quebec corridor, would involve a large investment in capital construction.

This work would, at least, involve many bridges, the diversion or closing of roads, and a measure of community upheaval. For higher speed investment the scale of activity would be that much greater.

Further, the trains themselves would represent a new form of transportation with different noise and visual impact characteristics.

There is every reason, therefore, to ensure that the various environmental impacts are thoroughly assessed through the legislated procedures now in place.

5.2 Jurisdiction

The federal government may be obliged to participate in the assessment of the environmental impact of the Windsor-Quebec high speed train project by virtue of the rules defining areas of federal jurisdiction contained in the 1984 Order-in-Council, and in view of its constitutional obligations.

Article 6 of the Order-in-Council stipulates that projects which require the financial support of the Canadian government or which are carried out on lands administered by the Canadian government are considered federal projects subject to environmental impact assessment procedures. Article 13 states that the minister responsible may submit a given project to the federal Minister of

the Environment for public review should the degree of public concern warrant.

Responsibility for the environmental impact assessment of the project would lie with the federal Transport Minister, and this would be under the jurisdiction of Environment Canada and possibly of other ministers.

The federal government's involvement in the project through the environmental impact assessment process can remain independent of environmental impact assessments by the provinces or may proceed jointly with the provinces.

5.3 The Procedures

Environmental impact assessment procedures at the federal level as well as in Quebec and Ontario comprise six relatively similar stages: planning of the environmental impact study, execution, government analysis, public review, the decision or Order-in-Council, and the construction permit.

There are, however, a number of noteworthy differences among the three procedures. The federal procedure is based upon an administrative process established by Order-in-Council rather than any specific laws, as is the case in Quebec and Ontario. The federal procedure is also unique in that it grants the minister responsible for the project wide powers of discretion with respect to planning and carrying out the impact study, government analysis and judging the project's acceptability.

The three procedures also differ at the public review stage. Ontario has adopted a quasi-judicial procedure for its public hearings and grants its boards (Environmental Assessment Board or Joint Board) the power to subpoena and swear in witnesses, as well as the power

of decision over the admissibility of the environmental impact assessment and/or the acceptability of the project.

By contrast, under the Quebec procedure, the Bureau des audiences publiques sur l'environnement (BAPE) is not granted any quasi-judicial or decision-making powers and the duration of public hearings is limited to four months. At the federal level, to reduce the risk of sterile debate attendant upon an exclusively judicial form of public hearings, the federal procedure grants the Boards the power to subpoena without the power to swear in witnesses. Nor are the Boards granted any decision-making power.

Under each of the three procedures, the decision or Order-in-Council authorizing a project is made at the political level. Under the federal procedure, the decision falls to the minister responsible for the project and the federal Minister of the Environment. In the event of disagreement, the matter is referred to Cabinet. The Ontario procedure allows the Minister of the Environment one month to modify or overturn the Board's decision. Under the Quebec procedure, Cabinet makes the decision on the recommendation of Quebec's Minister of the Environment .

5.4 Observations and Recommendation

Whether the context is federal, Ontario, or Quebec, environmental impact assessment procedures are usually long and costly. Although they share a similar structure, the three procedures of the Ontario, Quebec and federal governments differ in their methods of application, specific features, institutional framework and public consultation procedures.

However, it is possible both legally and practically to improve the procedure by, for instance, setting up a joint harmonizing structure

for assessing the environmental impact of the Windsor-Quebec corridor high speed train project.

The Task Force recommends a joint procedure, involving the two provinces and the federal government as appropriate, for the environmental impact assessment and the public review. This joint procedure would reduce the risk of the project being contested on strictly procedural grounds consequent upon the use of different environmental impact assessment procedures in Quebec and Ontario. Moreover, it will ensure that, subsequent to the environmental impact assessment and public reviews conducted by the provinces, no demand is made for an impact study and a public review under federal jurisdiction. Finally, not only the duration but probably also the costs of the entire environmental impact assessment process would be reduced.

TABLE OF CONTENTS

6. OBSERVATIONS, FINDINGS AND RECOMMENDATIONS

6.1. Observations and Findings

There is a powerful sense among the Task Force members, and within a broad spectrum of industrial, commercial and public interests, that a modern, highly visible high speed passenger train service which hourly linked Quebec City, Trois-Rivières and Montreal with Ottawa, Kingston, Toronto, London and Windsor would promote interprovincial passenger travel and strengthen their business and tourism relationships.

Throughout the Task Force hearings, the Task Force was reminded of the crucial role which the Corridor has in the national economy. Making the Corridor communities more efficient is essential if they are to succeed in the competitive world. Indeed, the Coalition of Corridor mayors urged the Task Force not to delay introduction of high speed rail as a means to create a competitive advantage.

There is considerable public support for improved passenger rail services within the Corridor because of the belief that the associated economic and social development would be extensive. The Task Force found again and again at each of the hearings a powerful sense that construction of the new link would do as much to bring Ontario and Quebec closer together as it will to profit our society.

With regard to **High Speed Rail Investment** the Ontario/Quebec Rapid Train Task Force finds:

- That, based on its work todate, it is not able to select a particular technology;

- That all of the high speed options examined have the capacity to generate an operating profit;

- Other users such as the postal service, couriers and «just-in-time» high speed freight would need to be explored to improve the financial viability of the investment;

- Further examination is required of the real potential for levering other types of private sector financial participation through station site development and land development rights;

- A high speed train will make a modest contribution to reducing congestion at key airports and on the Corridor freeways;

- A high speed train would not on its own resolve a key problem raised during the public hearings: urban congestion. It will, however, with expanded commuter rail services, help mitigate the situation;

- Ridership projections show that more passengers will be attracted to high speed rail if travel times can be dramatically reduced. Investment should ensure that door-to-door travel times are fully competitive with the air alternative and with the automobile alternative;

- That any technology selected will have to be assessed in the context of Canadian climatic conditions.

Regarding **Transportation Policy Issues for Government**, the Task Force finds the following:

- Maintenance and improved effectiveness of the existing passenger rail service is a priority, in order to provide continued regional service and to protect the rail market for future high speed rail implementation;

- The continued economic viability of the rail industry as a whole depends on government support for more flexible operating arrangements and government encouragement of more efficient use of the existing lines for intercity, commuter and freight use.

- That «streamlined» labour practices are required if a high speed passenger rail system is to achieve its inherent efficiencies;

- The private automobile will continue to be the dominant mode of passenger transportation in the Corridor. While the Montreal-Toronto and Ottawa-Toronto segments of the Corridor are exceptions to this pattern, as two-thirds and about one-half respectively of all trips are by public transport, we will continue to be committed to a form of transportation which is a significant source of atmospheric pollution and a less efficient user of energy.

- The success of high speed rail systems elsewhere has been related to the willingness of governments to shape consumer choice by policy interventions in the market-place or by direct financial support. For example, in the Paris-Lyon corridor, it is a matter of policy that there is no intercity bus service, and that air fares exceed rail fares. In Japan, the new Shinkansen lines require government subsidy to cover even operating costs. Automobile use is affected by very high gasoline prices and toll road charges in both countries. In all cases, there are significant capital and/or operating subsidies paid to the passenger railways;

- The preference for automobile use in the Corridor would be difficult to discourage as the mode of choice for many trips. Increased fuel taxes, the introduction of toll roads or increased licence fees would be met by taxpayer dissatisfaction.

Governments could have an impact on this aspect by requiring all public service travel to be by high speed rail;

- Improved commuter and regional services could have an impact on reduced automobile use, particularly where freeway congestion at city approaches is a problem.

The Task Force finds the following **Transportation Service Issues**:

- There is concern about the capacity of current carriers in the bus, air and rail modes to meet the needs of the frail, elderly and handicapped, and any high speed rail investment would have to make provision for the needs of those people;

- Intermodal connections in the Corridor are only poor-to-fair, compared with Europe. Improvements in linking air, rail and bus are urgently needed in all cities within the Corridor. Improved intermodal facilities would make public modes in the aggregate more attractive to the travelling public.

The Task Force observes the following **Transportation Planning Issue**:

- The selection of a right-of-way of HSR would be influenced by a number of conflicting factors. In principle, it would be desirable to use existing rights-of-way for reasons which are supported by farmers and environmentalists.

  There are two significant disadvantages: first, the existing rights-of-way contain many difficult curves, which limit maximum speed; second, combining high speed passenger service with freight service in the same right-of-way increases the cost of grade separations and creates a number of crossover problems in serving freight customers. However, it should be noted that

neither CN nor CP favoured sharing of the existing rights-of-way.

Concerning **Possible transportation futures**, the Task Force finds:

- It is extremely difficult to forecast changes in transportation technology over a 20-year time-span. Some people suggest that improved technical systems will resolve some of the airport congestion. Others suggest that alternate fuels or electric cars will eliminate much of the atmospheric pollution caused by the automobile;

- Regardless of these technological predictions, the Task Force believes that the potential of the rail mode to provide intercity transportation at a cost which is less than that for a significant increase in freeway or airport capacity argues for an investment in high speed rail at an appropriate time in the future.

6.2. Recommendations

The Task Force has concluded that a high speed passenger rail service could make a significant contribution to business and personal travel in the Quebec City-Windsor corridor in the 21st century. This transportation concept has the potential to provide a new travel experience to millions of Canadians and foreign tourists.

The information that the Task Force has obtained has provided an excellent base that was not available before. However, before there can be any financial commitment by governments to an investment in high speed rail, that base needs to be supplemented by intergovernmental discussion, by additional private sector business information, plus more detailed review of work already initiated by the Task Force. The additional studies needed are outlined in the

recommendations that follow, and consideration should be given to the ordering and timing of them, so that they may run concurrently where possible.

The Task Force recommends that this additional assessment should be undertaken by the two provincial governments, with the active involvement of the federal government and the private sector, as appropriate.

The following specific recommendations are offered for the consideration of the Premiers of Ontario and Quebec:

1. **A final decision of «go or no-go» cannot and should not be made at this time. A number of areas should be addressed;**

2. **The two provincial governments should actively involve where appropriate, the federal government and the rail operators and private sector in all of the further studies which are required;**

3. **A more comprehensive database must be developed, encompassing all modes, which assesses a full year's travel patterns against the concept of a new high speed passenger rail service and which would lead to an updated full market demand analysis sufficient to satisfy potential investors;**

4. **There should be a thorough review, involving the rail operators, of the optimum routing for a very high speed passenger rail service, including alignment, capital costs, operating and maintenance expenditures, service options and travel times;**

5. **There should be a full definition of the environmental assessment process to be followed if the decision is taken to design and implement HSR;**

6. A more detailed assessment is needed of the environmental benefits to be gained from the introduction of HSR;

7. There should be a full cost-benefit analysis of the impacts of introducing HSR, which would lead to a more comprehensive understanding and statement of socio-economic benefits;

8. A more detailed examination of the Crown corporation and public utility options for the development and implementation of HSR is recommended;

9. Discussion of the prospective budgetary advantage to the federal government of a partnership investment in Corridor HSR, as a successor to subsidized conventional passenger rail service, is required;

10. A full review and assessment is needed of the commercial and real estate opportunities occasioned by the introduction of a high speed passenger rail service, including concessions, advertising, hotel, retail and residential real estate development, and the introduction of high speed postal and small freight services;

11. There should be close examination of the current railway labour regimes, and an assessment of the changes required to ensure productivity and efficiency in the operation of a high speed passenger rail service;

12. A full examination is needed of current railway legislation and regulation, both federal and provincial; also an assessment of the legal framework is necessary to enable the implementation and operation of a high speed passenger rail service;

13. An intensive examination should be conducted of the potential for rail infrastructure and service rationalization necessary to ensure the utilization of existing railway rights-of-way for HSR;

14. There should be a full examination of the feasibility of introducing, in the future, a high speed passenger rail service based on technologies capable of speeds well in excess of 300 kph;

15. A full examination is needed by all levels of government of the policy support, including capital and operating subsidies, the provision of infrastructure, tax expenditures, and the use of tax revenues afforded competing modes of transportation; and,

16. There should be a thorough study of the need for regional services to those communities which might suffer a deterioration in service due to a concentration on high speed rail.

APPENDICES

APPENDIX «A»

LIST OF

PRINCIPAL

CONSULTANTS' WORK

LIST OF PRINCIPAL CONSULTANTS' WORK

	CONSULTANTS	TITLES & DATES
1.	KPMG Peat Marwick Stevenson & Kellogg Management Consultants	Coordinating Consultant's Summary Report (January 1991)
2.	Canadian Institute of Guided Ground Transport (CIGGT) in association with Peat Marwick Stevenson and Kellogg (Montreal)	Review of Previous Studies of High-Speed Rail in the Quebec/Ontario Corridor (April 1990)
3.	Transurb Inc.	High-Speed Rail in the Quebec/Ontario Corridor: A Review of Previous Studies (May 1990)
4.	Transportation Economics and Management Systems, Inc. in Association with Robert Sward, P. Eng.	Operating Strategy Study for High Speed Rail in the Quebec/Ontario Corridor (October 1990)
5.	KPMG Peat Marwick Main & Co. in Association with Frank S. Koppelman	Analysis of the Market Demand for High Speed Rail in the Quebec/Ontario Corridor (June 1990)
6.	Dessau	A Review of the Environmental Impact of Investment in High Speed Rail in the Quebec/Ontario Corridor (August 1990)
7.	Alpha Beta Gamma Consultants, Inc. & R.L. Banks & Associates, Inc.	Evaluation of the Socio-Economic Impacts on the Transportation Sector of Investment in High Speed Rail in the Quebec/Ontario Corridor (July 1990)
8.	Ernst & Young Management Consultants	The Social and Economic Impact of a High Speed Rail Link in the Quebec/Ontario Corridor (November 1990)

APPENDIX «B»

PARTICIPANTS

TO THE

PUBLIC CONSULTATION

- PUBLIC HEARINGS
- MUNICIPAL MEETINGS
- WRITTEN SUBMISSIONS

PUBLIC

HEARINGS

OTTAWA

March 20th & 21st, 1990

Tuesday March 20th

Outaouais Development Corporation (SAO)	Mr. Jean-Marie Séguin, President & General Manager Mr. Guy Gagnon, Secretary General
Transport 2000 Canada	Mr. Darrell Richards, President Mr. Harry Gow, Vice-President - Eastern Mr. David Jeanes, Treasurer
Canadian Institute of Planners	Mr. David Sherwood, Executive Director

Wednesday March 21st

Roads & Transportation Association of Canada (RTAC)	Mr. Norman Brown, Executive Director Mr. John Pearson, Director of Technological Progress
City of Hull	Mr. Michel Légère, Mayor
Outaouais Chamber of Commerce	Mrs. Monique Cyr, Chairman
City of Ottawa	Mr. Dave O'Brien, Chief Administrative Officer

OTTAWA (cont'd)

March 20th & 21st, 1990

Wednesday March 21st

Regional Municipality of Ottawa/Carleton	Mr. Andy Haydon[1], Chairman Dr. Louis Shallal, Director Transportation Planning Mr. Andrew Hope, Planner, Policy & Program Division Mr. Jean D. Paré, Planning Department
The Outaouais Regional Council for Development	Mr. Gilles Gagné, General Manager
Canadian Bus Association	Mr. Frank Trotter, Executive Director
National Capital Commission	Mrs. Jean Pigott, Chairman

QUEBEC CITY

April 10th & 11th, 1990

Tuesday, April 10th

Transport 2000 Quebec	Mr. Normand Parisien, Director-Coordinator
Regional Municipality of la Côte-de-Beaupré	Mr. Jacques Pichette, Secretary-Treasurer Mr. Guy Desrosiers, Director of Operations, Mount Ste-Anne Park Father Victor Simard(1), Basilica Ste-Anne-de-Beaupré
Association of Quebec Builders of Roads and Major Works	Mr. Gabriel Richard, General Manager

Wednesday, April 11th

Chamber of Commerce of Ste-Foy	Mr. Serge Laquerre, Chairman Mr. Yvan Lachance, General Manager.
City of Trois-Rivières	Mr. Gilles Beaudoin, Mayor. Mr. Jacques Lacasse, Chamber of Commerce of Trois-Rivières
Chamber of Commerce and Industry for Metropolitan Quebec City	Mr.Bruno Bégin, Chairman Mr. Pierre Talbot, Executive Vice-President and General Manager Mr. Richard Morency, Chairman of Transport Committee Mr. Daniel Lachance, Member
Chamber of Commerce of the South Shore of Quebec City	Mr. Claude Arsenault, General Manager
City of Quebec/Quebec Urban Community	Mr. Jean-Paul L'Allier, Mayor of Quebec City Mr. Michel Rivard, Chairman of the Executive Committee of Quebec Urban Community

TORONTO

April 19th & 20th, 1990

Thursday, April 19th

City of Toronto	Mr. Howard Levine, Alderman
Ontario Federation of Labour	Mr. Ken Signoretti, Executive Vice-President Mr. Duncan MacDonald, Director of Programs
Ontario Traffic Conference	Mr. Doug T. Crosbie, President
Federation of Canadian Municipalities	Mrs. Doreen Quirk, Second Vice-President Mrs. Patricia Huntsley, Director of Policy and Research Mr. Douglas Thwaites, Advisor
Peel Regional Municipality	Mr. Douglas Thwaites, P. Eng.
Think Rail Group	Mr. Jan van den Andel, Chairman Mr. Dolf Hiel, Secretary
Kingston Area Economic Development Commission	Mr. David Cash, Director Mr. Ken Keyes, MPP
Private Citizen	Mr. Howard Davy
Ontario Chamber of Commerce	Mr. John Klassen, Chairman - Transportation Committee
Private Citizen	Mr. D.J. Fader

April 19th & 20th, 1990

Regional Municipality of Hamilton/Wentworth	Mr. Reg Whynott, Chairman Mr. Paul White, Director of Operations - Transportation Services Department

Friday, April 20th

Metro Toronto	Mr. Alan Tonks, Chairman Mr. Fergy Brown, Mayor of York
Metro Toronto Councillor	Mr. Dale Martin
Board of Trade of Metro Toronto	Mr. Gordon W. Riehl, Chairman
Bombardier Inc.	Mr. Pierre MacDonald, Vice-President
Electrical Contractors Association of Ontario	Mr. Robert O'Donnell, Vice-President
Ontario Motor Coach Association	Mr. Brian Crow, President Mr. Robert Warren, Legal Counsel
Consumers Association of Canada (CAC)	Mrs. Joan Huzar, Chairman Mrs. Mary Pappert, Secretary
City of Oshawa	Mr. Robert J. Nicol, Economic Development Officer

WINDSOR

May 2nd & 3rd, 1990

Wednesday, May 2nd

City of Windsor	Mr. John Millson, Mayor
City of London	Mr. Thomas Gosnell, Mayor Mr. Jack Burghardt, Deputy Mayor Mr. Barry Scott, London Chamber of Commerce Mr. Paul Yorke, Chairman of the City of London's Environment & Transportation Committee
Transport 2000 Ontario	Mr. John McCullum, President Mr. Jim Armstrong, Vice-President
Windsor and District Labour Council	Mr. Nick LaPosta, Financial Secretary Treasurer Mr. Gary Parent
Private Citizen	Mr. Ed Banninga

Thursday, May 3rd

Ontario Minister of Transportation	Honourable William Wrye
Windsor-Essex County Development Commission	Mr. Louis M. Papp Mr. Paul Bondy

WINDSOR (cont'd)

May 2nd & 3rd, 1990

Michigan Department of Transportation	Mr. W. Bailey, Administrator of the Systems Planning Division
City of Chatham	Mr. Hugh J. Thomas, Chief Administrative Officer
Regional Municipality of Waterloo	Mrs. Sally A. Thorsen, Commissioner of Planning & Development
City of Kitchener	Mr. James Wallace, Commissioner of Legal Services & City Solicitor
County of Kent	Mr. Tom Suitor, Warden Mr. John Ferguson, County Engineer
Private Citizen	Mr. Ross Snetsinger
Consumers Association of Canada (Windsor)	Mrs. Lucienne Bushnell, Vice-President
Windsor Chamber of Commerce	Mr. Mark L. Jacques, Executive Director Mr. Richard Korscil

MONTREAL

May 10th & 11th, 1990

Thursday, May 10

Private Citizen	Mr. Harold Geltman
CN Rail	Mr. Eldon Horsman, Vice-President Planning
Alexandria Save The Train Committee	Mr. Dane Lanken, Chairman
Asea Brown Boveri (ABB)	Mr. René Marcoux, Executive Vice-President
Montreal Urban Community	Mr. Michel Hamelin, Chairman of the Executive Committee Mr. Peter Yeomans, Chairman of the MUC Commission on mass transit Mrs. Thèrese Daviault[1], Vice-President of the MUC Commission on mass transit
City of Montreal	Mr. Jean Doré, Mayor
Chamber of Commerce of Metro Montréal	Mr. L. Jacques Ménard, Chairman Mr. Jacques Auger, Chairman - Transport Committee Mrs. Paule Doré, General Manager Mr. Jean Demers, Member - Transport Committee
Quebec Union for Conservation of the Environment	Mr. Luc Gagnon, Vice-President - Education
Quebec Chamber of Commerce	Mr. Jean R. Lambert, Chairman Mr. André Joli-Coeur, Chairman - Transport Committee Mr. Jacques Charland, Member - Transport Committee

Canadian Paraplegic Association (Ontario)	Mr. William A. Hoch, Executive Director
United Counties of Prescott and Russell	Mr. Gaston Patenaude, Past Warden of the United Counties Mr. Yves Laviolette, Immediate Past Warden of the United Counties

Friday, May 11th

Quebec Bus Owners Association	Mr. Sylvain Langis, Chairman Mr. Jacques Guay, Vice-President and General Manager Mr. Guy Poliquin, Legal Advisor
Greater Montreal Convention and Tourism Bureau	Mr. Charles Lapointe, Chairman and General Manager
City of Hull	Mr. Michel Légère, Mayor
City of Laval	Mr. Gilles Vaillancourt, Mayor Mr. Yvon Tremblay, Chairman - Laval Transport Society
Bombardier Inc.	Mr. Pierre MacDonald, Vice-President
Laurentian Development Corporation	Mr. Paul Mercier, Chairman Mr. Claude Ducharme, General Manager
Quebec Union of Municipalities	Mr. Jean-Louis Desrosiers, Chairman Mr. Raymond L'Italien, General Manager Mr. Pierre Prévost, Economist

HULL

May 24th, 1990

Thursday, May 24th

City of Ottawa	Mr. Shawn Mackie, Director of Marketing, City of Ottawa Mr. Harry Gow, President Transport 2000 Canada Mrs. Charlene Lambert, Senior Economic Officer - City of Ottawa
Asea Brown Boveri (ABB)	Mr. René Marcoux, Executive Vice-President Mr. Raj Kapila, Manager Transportation Systems Development Mr. Stefan Nilson, Vice-President Technical Coordination Mechanical
City of Cornwall	Mr. Guy Léger, Municipal Councillor Mr. Paul Fitzpatrick, Director Economic Development
City of Belleville	Mr. George A. Zegouras[1], Mayor Mr. Doug Crosbie, Municipal Councillor - Member Ontario Traffic Conference
City of Gatineau	Mr. Robert Labine, Mayor Mr. Claude Doucet, General Manager Mr. Roland Morin, Director Engineering
Regional Municipality of Papineau	Mr. Henri Hébert, Mayor of Papineauville and Substitute Warden of the Regional Municipality Mr. Jean Bissonnette, Development Coordinator

May 24th, 1990

Thursday, May 24th

The Coalition of Corridor Mayors	Mr. Jean Doré, Mayor of Montreal Mr. Art Eggleton, Mayor of Toronto, accompanied by mayors Gilles Beaudoin of Trois-Rivières and Thomas Gosnell of London and the representatives of the other mayors of the Coalition, Mr. Pierre Mainguy, member of the Executive committee, City of Quebec, Mr. George Brown, Municipal Councillor, City of Ottawa, and Mrs. Linda Greenawy, Special Projects Officer - City of Windsor
CP Rail	Mr. Michael E. Kieran, General Manager - Infrastructure
Association of Consulting Engineers of Canada	Mr. Pierre Franche, General Manager Mr. Anthony Burgess, Director Communication and Policy Development Mr. Neil Irwin[1], Chairman - Transport Committee
Outaouais Development Corporation	Mr. Jean-Marie Séguin, President and General Manager Mr. Franco Matterazzi, Director Research and Development

Note: [1] Was not present at the public session.

MUNICIPAL

MEETINGS

BROCKVILLE

March 13th, 1990

City of Brockville	Mr. Stephen J. Clark, Mayor
County of Leeds and Grenville	Mr. Arch Ostrom, Warden
Town of Smiths Falls	Mr. William Lesurf, Councillor
Town of Prescott	Mr. Jim Knudson, Councillor

CORNWALL

March 14th, 1990

United Counties of Stormont Dundas and Glengarryn	Mr. Claude Cousineau, Warden Mr. Raymond Lapointe, Coordinator
City of Cornwall	Mr. Paul Fitzpatrick, Director of Economic Development
United Counties of Prescott & Russell	Mr. Claude Gravel, Warden of the Counties Mr. E. Lépine-Fontês, Economic Development Officer Mr. Gaston Patenaude, Reeve of Russell Township
Stormont Dundas and Glengarry	Mr. Noble Villeneuve, M.P.P.
Cornwall	Mr. John Cleary, M.P.P.

KINGSTON

March 15th, 1990

City of Kingston	Mr. Gary Bennett, Alderman Mr. Don B. Rogers, Alderman Mrs. Silvia Coburn (representing Steven Silver, CAO Kingston)
Chamber of Commerce	Mrs. Petra Ann D'Souza
Kingston Area	Mrs. Cec Pare, Commissioner, Kingston Area Economic Development
Township of Kingston	Mr. Lloyd White, Deputy Reeve
County of Lennox and Addington	Mr. John D. McDonald, Warden
County of Frontenac	Mr. Bill Van Kempen, Warden
Prince Edward and Lennox	Mr. Keith McDonald, M.P.P.
Kingston and The Islands	Mr. Ken Keyes, M.P.P.
Frontenac and Addington	Mrs. Lorna Cambino, (representing Mr. Larry South, M.P.)
Frontenac & Addington & Kingston	Mr. K.C. Panageutopoulos, (representing Mr. Peter Milliken, M.P.)

LONDON

April 24th, 1990

MORNING

City of London	Mr. Thomas C. Gosnell, Mayor Mr. Dan McDonald, Executive Assistant
County of Elgin	Mrs. Marian Millman, Warden
Town of Strathroy	Mr. John F. Quinney, Reeve
County of Middlesex	Mr. Alan Johnson, Warden
University of Western Ontario	Dr. Edward G. Pleva
London-Middlesex	Mrs. Susan Truppe (representing Mr. T. Clifford, M.P.)
London East	Mrs. Doreen Vandewetering (representing Mr. J. Fontana, M.P.)

AFTERNOON

Town of Ingersoll	Mr. Don Hillis, Councillor (representing Mayor D. Harris) Mr. Jim Robins, Councillor (representing Mayor D. Harris)
County of Kent	Mr. Tom Suitor, Warden Mr. John Ferguson, County Engineer

KITCHENER

April 25th, 1990

MORNING

City of Kitchener	Mr. Dominic Cardillo, Mayor Mr. Jim Wallace, Commissioner, Legal Services
City of Waterloo	Mrs. Joan McKinnon, Councillor
Region of Waterloo	Mr. George Bechtel (representing Ken Seiling, Regional Chairman)
City of Guelph	Mr. Donald E. Peacock (representing Mayor of Guelph)
County of Wellington	Mrs. Pat Salter, Reeve
Kitchener	The Honourable David Cooke, M.P.P.
Kitchener/Waterloo Action Committee VIA Rail - CAC (Ontario)	Mrs. Mary Pappert

AFTERNOON

City of Brantford	Mrs. Karen George, Mayor
Town of St. Mary's	Mr. Gerald Teahen, Mayor
City of Stratford	Mr. Jim Morris, Alderman (representing Mayor D. Hunt)
County of Perth	Mr. Edwin Illman, Warden

COBOURG

May 8th, 1990

County of Peterborough	Mrs. Doris Brick, Warden
Town of Cobourg	Mr. Angus V. Read, Mayor Mr. Don Kirkup, Councillor
County of Hastings	Mr. Bruce Davis, Warden
County of Northumberland	Mr. Peter Cramp, C.A.O.
Northumberland	Mrs. Vicki Kimmet (representing Christie Stewart, M.P.)
Northumberland	Mrs. Joan Fawcett, M.P.P.

WRITTEN

SUBMISSIONS

City of Buckingham	Mr. R.W. Scullion, Mayor
Municipal Corporation of l'Epiphanie Parrish	Mr. Pierre Goyette, Mayor
City of Chicoutimi	Mrs. Hélène Savard, Barrister
Chamber of Commerce of Beauport	Mrs. Claudette Coulombe, General Manager
Pollution Probe Foundation	Mr. David McRobert, Energy Project Coordinator
Ontario Travel Industry Association	Mrs. Stephanie Paterson
Private Citizen	Dr. Bessie Borwein
Private Citizen	Mr. Kevin J. Egan
Private Citizen	Mr. Albert J. Mettler, Consultant in Electric Railway Design
Bergeron, Gaudreau & Pinet	Mr. Louis Archambault, Barrister

Bureau of Competition Policy	Mr. Howard I. Wetson, Director of Investigation and Research, Consumer and Corporate Affairs Canada
Private Citizen	Mr. Roger Létourneau, Consultant in Transportation and Marketing
Private Citizen	Mr. Charles H. Forsyth
City of Drummondville	Resolution - Municipal Council
Supported by:	
City of Richmond	Resolution - Municipal Council
City of Thetford Mines	Resolution - Municipal Council
City of Asbestos	Resolution - Municipal Council
MRC of Drummond	Resolution - Regional Municipality Council
Chamber of Commerce of the County of Drummond	Resolution - Executive Committee
Economic Development Society of Drummondville	Resolution - Board of Directors
MRC Arthabaska	Resolution - Administrative Committee
City of Sherbrooke	Resolution - Municipal Council

APPENDIX «C»

INSPECTION TRIPS

AND

HIGH SPEED RAIL TECHNICAL CHARACTERISTICS

INSPECTION

TRIPS

INSPECTION TRIPS

In late March and early April, the members of the Ontario-Quebec Rapid Train Task Force undertook inspection trips to high speed train operations in Europe and Japan. The European countries visited were Sweden, Italy, France and Germany.

The European delegation was led by Rémi Bujold, Quebec Co-chairman of the Task Force, and included Task Force members Nancy Orr-Gaucher, Wendy Butler, and Charlie Tatham. Also present on the visit were Paul-André Fournier, Quebec Ministry of Transportation, Norm Mealing, Ontario Ministry of Transportation, James Roche and Gabor Matyas, VIA Rail, and Douglas Smith, Transport Canada. The delegation was joined for the Lyon/Paris segment by Tom Porter and Pierre Mainguy, representing the cities of Windsor and Quebec City, respectively.

The Japanese delegation was led by Task Force member Jean Pelletier, and included Task Force member Henri-François Gautrin, André Ouellet, Executive Director of the Task Force, and Ian Chadwick, Research Director for the Task Force. Also present during the visit were Martin Brennan, Transport Canada, and Réjean Béchamp and Gerry Kolaitis, VIA Rail. The Japanese trip was to be led by Bob Carman, Ontario Co-chairman of the Task Force but, unfortunately, he was not able to participate due to illness.

A visit was made by Bob Carman, Jean Pelletier, Charlie Tatham and Ian Chadwick to Amtrak's maintenance facilities in Albany (Rensselaer), New York. It is there that Amtrak's fleet of turbine-powered equipment is maintained. Task Force members separately visited VIA Rail's Montreal maintenance centre where VIA's LRC corridor equipment is maintained and serviced.

HIGH SPEED RAIL

TECHNICAL

CHARACTERISTICS

Table C.1 – Technical characteristics – Shinkansen

Item/Section		Tokaido	Sanyo		Tohoku	Joetsu
		Tokyo–Osaka	Osaka–Okayama	Okayama–Hakata	Ueno–Morioka	Omiya–Niigata
Route length (distance)	km	515	161	393	496	270
Tunnels	km	69 (13%)	58 (36%)	223 (57%)	115 (23%)	106 (39%)
Bridges	km	57 (11%)	20 (12%)	31 (8%)	78 (16%)	30 (11%)
Viaduct	km	116 (22%)	74 (45%)	86 (22%)	271 (55%)	133 (49%)
Time required	h	2h56	56 min	2h19	2h32	1h33
Maximum speed	km/h	220	230	230	240	240
Minimum curve radius	m	2 500	4 000			
Maximum grade	%	20/1 000	15/1 000			
Minim. longit. curve radius	m	10 000	15 000			
Construction gauge	mm	H = 7 700	W = 4 400			
Rolling stock gauge	mm	H = 5 450	W = 3 400			
Rail	kg/m	60,8kg/m	1 500m long welded rails			
Track gauge	mm	1 435				
Formation width	m	10,7	11,6	11,0	11,6	11,6
Distance track centers	m	4,2	4,3	4,3	4,3	4,3
Power transmitting system		154 kV or 77 kV 2 lines	275 kV or 220 kV 2 lines	275 kV or 220 kV 2 lines	275 kV 2 lines	275 kV 2 lines
Feeding system		AC 25 kV,60 Hz Single phase Booster-transf	AC 25 kV,60 Hz Single phase Auto-transf.	AC 25 kV,60 Hz Single phase Auto-transf.	AC 25 kV,50 Hz Single phase Auto-transf.	AC 25 kV,50 Hz Single phase Auto-transf.
Catenary system		Composite compound	Heavy compound	Heavy compound	Heavy compound	Heavy compound
Train control		Automatic train control,centralized traffic control,computer traffic control				
Construction period		5 1/2 years	5 years	5 years	10 ½ years	11 years
Opening date		October, 1964	March, 1972	March, 1975	June,1982	November, 1982

Source: Jane's World Railways 1990-91

Table C.2 – Technical characteristics – TGV, ICE, Pendolino, X–2000 and InterCity

Item/Section		TGV		ICE	Pendolino	X–2 000	InterCity
		Paris–Lyon	Paris–Le Mans–Tours	Hamburg–Münich	Rome–Milan	Stockholm–Göteborg	London–Edinburgh
Route length (distance)	km	425	284	426	554	456	640
Tunnels	km		12,4	36%			
Bridges	km			10%			
Viaduct	km	2	11,4				
Time required	h	2h00	1h00	4h 15	3h35	3h35	4 h 00
Maximum speed	km/h	270	300	250–280	250	200	200
Minimum curve radius	m	4 000	4 000	5 100	2 000	805	805
Maximum grade	%	35/1 000	25/1 000	12,5/1 000	18/1 000	27/1 000	27/1 000
Minim. longit. curve radius	m	16 000	16 000	16 000		10 000	10 000
Construction gauge	mm	UIC	UIC	UIC	UIC	UIC	UIC
Rolling stock gauge	mm	H = 3 480,	W = 2 904	UIC 505		H= 3 800, W= 3 080	
Rail	kg/m	UIC 60	60,3 kg/m	UIC 60		50	
Track gauge	mm	1 435					
Formation width	m	11,5	13,6	13,7	11,7		8,6–11
Distance track centers	m	4,2	4,2	4,7	5,0	3,4	3,4
Power transmitting system							
Feeding system		AC 25kV–50Hz 1,5 kV DC 2x25 kV	AC 25kV–50Hz 1,5 kV DC 2x25 kV	15kV–16 2/3 Hz	3 kV DC	AC 15kV 16 2/3Hz	
Catenary system				Type Re 250			
Train control		Automatic block,automatic pilloting+cab.sign					
Construction period		5 years	4 1/2 years				
Opening date		September, 1981	September, 1989	Mai, 1991	1990	September,1990	1991

Sources: *Jane's World Railways 1990–91*

ICE–High Tech on rails

Table C.3 – Technical Characteristics of Rolling Stock

Item/Train		Shinkansen	TGV		ICE	Pendolino	X–2 000	InterCity
		Tohoku–Joetsu	Paris–Lyon	Paris–Le Mans Tours	Hamburg–Münich	Rome–Milan	Stockholm–Göteborg	London–Edinburgh
Wheel diameter (locomotive)	mm	910	920	920	1 030	890	1 100	1 000
Maximum speed	km/h	240	270	300	280	250	225	225
Specific Power	kW/t	15,06	14,55	17,98	9,73	14,48	9,50	9,86
Specific Weight	kg/m	2 577	2 218	2 055	2 090	1 695	2 143	1 860
Train Weight	tons	733,1	443,4	489,3	980	483,5	343	454
Power/train	kW	11 040	6 450	8 800	9 600	7 000	3 260	9 400
Consist		12 EMU	1–8–1	1–10–1	1–14–1	11 EMU	1–5	1–9–1
Seat/train		885	386	485	660	450	250	576

Sources: Jane's World Railways 1990–91

International Railway Journal – Special Supplement – ICE

APPENDIX «D»

DISCUSSIONS

WITH

NATIONAL

AND

INTERNATIONAL

INVESTORS

AND

SUPPLIERS

DISCUSSIONS WITH NATIONAL AND INTERNATIONAL INVESTORS AND SUPPLIERS

1. **Companies Manufacturing Railway Rolling Stock**

   1.1 Asea Brown Boveri (ABB)

   1.2 ANF Incorporated Turbomeca

   1.3 Bombardier Inc.

   1.4 GEC Alshtom

   1.5 General Motors of Canada - Diesel Division

   1.6 Nippon Sharyo, Ltd

   1.7 Thyssen Henschel

   1.8 Urban Transportation Development Corporation (U.T.D.C.)

2. **Companies Specializing in Railway Transportation Consulting, Engineering and Project Management**

   2.1 France - Sofrerail

   2.2 Germany - D.E. Consult

   2.3 Great Britain - Transmark

   2.4 Japan - Railway Technical Research Institute

3. **Companies Specializing in Managing Large Engineering Projects**

   3.1 Booz, Allen and Hamilton, Inc.

   3.2 M.M. Dillon Ltd.

   3.3 Hatch and Associates, Inc.

   3.4 Lavalin Inc.

   3.5 Marshall Macklin Monaghan Ltd.

   3.6 SNC

4. Railway Operating Companies

4.1 Canadian National (CN)

4.2 Canadian Pacific (CP)

4.3 VIA Rail

4.4 Foreign Railway operating companies:

- o France - Société Nationale des Chemins de Fer (SNCF)
- o Germany - Deutsche Bundesbahn (DB)
- o Great Britain - British Railway (BR)
- o Italy - Ferrovie Dello Stato (FS)
- o Japan - Japan National Railways (JNR)
- o Sweden - Swedish National Railway (SJ)
- o United States - Amtrak

5. Financial Institutions

5.1 Bank of Montreal

5.2 Banque Nationale de Paris

5.3 Crédit Lyonnais

5.4 Royal Bank of Canada

5.5 Société Financière Indosuez

5.6 Société Générale

APPENDIX «E»

LIST OF TASK FORCE MEMBERS, STAFF AND CONTRIBUTORS

LIST OF TASK FORCE MEMBERS, STAFF AND CONTRIBUTORS

Task Force Members

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APPENDIX «F»

GLOSSARY

GLOSSARY OF TERMS - HIGH SPEED RAIL

Articulated - Rail vehicle design by which two passenger vehicles share a common bogie (or truck) between the ends of the two cars. This concept reduces the number of bogies per train, (hence reducing cost, rolling resistance and noise) and improves ride quality.

Bogie (or, in North American railway terminology, «truck») - Assembly comprising the wheels, axles, suspension system (and in the case of powered cars, the electric motors) on which rail vehicles ride.

Buff load - The longitudinal compressive load to which rail vehicles are designed. A head-on collision is the situation under which a rail vehicle will be subject to the maximum buff load.

Catenary - Overhead contact wire system to supply electric energy to trains while in motion. Comprised of support masts, insulators, contact and feeder wires and tensioning mechanisms.

Catenary supply voltage - The nominal voltage supplied to the train for propulsion power. Power supplies are either DC (direct current) or AC (alternating current) at frequencies of either 60 or 50 hz.

Consist - Train configuration and size. In the case of locomotive hauled trains, it refers to the number of locomotives and passenger cars. For trains of self propelled vehicles, the term refers to the number of passenger vehicles only.

Consumer surplus - The difference between the price paid for a good or service and the higher price which the consumer would have paid for the same amount of that good or service. Generally speaking, the greater the consumer surplus, the greater the welfare of consumers.

Distance between track centres - The separation distance between the centrelines of two parallel tracks or guideways. In high speed rail, the distance is kept as large as possible in order to minimize the aerodynamic forces of two trains passing at speed in opposite directions.

Elasticities - Measure of the responsiveness of suppliers and consumers to changes in market conditions.

GLOSSARY OF TERMS - HIGH SPEED RAIL
(Cont'd)

Guideway - Lateral/longitudinal vehicle guidance and support system. For traditional steel wheel on steel rail systems, this is the track structure comprising rails, railway ties, ballast and turnouts. For Maglev systems, the guideway is comprised of the guidance beams, support pillars, wayside levitation and propulsion magnetic coils and turnouts.

Induced traffic - The additional passenger trips generated in a corridor by a new service above and beyond the traffic which existed before or would have existed without the new service.

Maglev - Magnetic levitation. A group of high speed transportation technologies that use attractive or repulsive magnets (in the vehicle and/or guideway) to lift, guide and propel the vehicle. Unlike traditional steel wheel on steel rail trains, Maglev vehicles do not physically contact the guideway.

Maximum gradient - The highest elevation over a given distance a particular train design is able to climb at a given speed (usually system maximum speed) and train power. Maximum gradient is usually expressed as a percentage (vertical height per longitudinal length).

Minimum curve radius - The minimum radius of curvature around which a vehicle can travel at a given speed (usually the system maximum speed). The minimum radius is determined by the passenger comfort limits for withstanding lateral acceleration.

Specific power - The ratio of the total train traction power per total train weight typically expressed in kW/tonne.

Specific weight - The total train tare weight per unit length, usually expressed in kg/metre.

Subgrade - Earthen structures designed to support the guideway. The subgrade is designed to provide a well drained, stable base for the guideway structure.

Superconductivity - A phenomenon by which certain materials under certain conditions (typically low temperatures) exhibit two characteristics, namely zero electrical resistance and the ability to expel magnetic fields. Certain Maglev vehicle designs use superconducting magnets to create powerful magnetic fields to generate lift and propulsion forces.

Synchronous - AC electric motor design by which the rotor of the motor shaft rotates at the same speed as the revolving electromagnetic field generated by the stationary windings. The synchronous motor has better performance and requires less maintenance than an equivalent DC motor.